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December 1979

Department of the Interior
Federal Coal Management Program

FINAL REPORT AND RECOMMENDATIONS FOR THE SECRETARY ON
FAIR MARKET VALUE AND MINIMUM ACCEPTABLE BIDS FOR
FEDERAL COAL LEASES

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ACKNOWLEDGEMENTS

This report and recommendations to the Secretary represents the results of 2 years of steady effort by three task forces, each building on the effort of their predecessor. The first group to work on this effort was led by John Pederson of the USGS, who has persevered throughout this effort, and included Don Fisher of the BLM and Jules MacKallor, Edward Rodgers, and Gregory Spanski of the USGS. The second group brought the effort up to the June draft report to the Secretary and initial recommendations; it was led by Patrick Geehan, and included Clif Brownell, and Neil Jacquot of BLM, Donald Bieniewicz of Office of Policy Analysis (PPA), and MacKallor, Loren Setlow, Ray Cheeseman, and Thomas Blair of the USGS. Major contributors to this report are Pederson, Eric Kaarlela, William Watson, and Rich Bernknopf from the USGS, Allan Dickerman and Brownell of BLM, and Bieniewicz and Charles Towle of PPA. Numerous other persons have contributed to the final efforts to reach a consensus recommendation. Key contributions were made by Gary Horton, Chief, Branch of Onshore Evaluation, USGS; Charles Rech, Acting Director, Office of Coal Leasing, Planning and Coordination; Lester Silverman, Director, Office of Policy Analysis; and Lawrence McBride, Assistant Solicitor, Onshore Minerals. Anthony Prato and Robert Lawton of the Department of Energy Leasing Policy Development Office have also supported these efforts through the latter stages of development. Finally, the task force was supported in various technical aspects of its study by Hoff Stauffer, President of ICF, Inc., and Daniel Klein and Robert Black of his staff. ICF also assembled an outside expert panel comprised of Dr. James B. Ramsey, Chairman of the Department of Economics at New York University; Dr. Richard Gordon, Professor of Mineral Economics at Pennsylvania State University; Mr. Laurence Moss, a consultant on environmental and energy policy and Chairman of the Environmental Caucus of the National Coal Policy Project; Mr. Charles Knight, President of Knight Appraisal Services; and Dr. Donald Gentry, Professor of Mining Engineering at the Colorado School of Mines who made many useful suggestions to the task force.

Charles L. Towle
Chairman

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SECTION I. FAIR MARKET VALUE TASK FORCE RECOMMENDATIONS

In June 1979, the Secretary of the Interior instructed the Federal coal leasing fair market value task force "... to develop a consensus on implementation of the (earlier fair market value task force) recommendations before remanding them to the appropriate office and bureaus for implementation." The task force is pleased to report back to the Secretary with general consensus recommendations for Departmental policy on determining fair market value and minimum acceptable bids for Federal coal.

Consensus on an issue as multi-dimensional as that of minimum acceptable bids requires the balancing of many Departmental goals. The Congress mandated in the Federal Coal Leasing Amendments Act of 1976 that no Federal coal lease can be sold for less than its fair market value (FMV). However, there are many other Federal goals that are just as relevant to Federal coal lease minimum acceptable bid policy. These can be summarized as follows: promotion of national economic efficiency in the development of the resource; timely development of the resource (otherwise known as resource conservation); promotion of competition in the coal industry; countering rising energy prices and inflation; an equitable sharing of Federal coal value of production between the public and producers; socio-economic responsibility (50 percent of Federal coal income is returned to the originating State); and national security (national energy supply) considerations. Achieving a favorable balance among these goals in an administratively workable system lies at the heart of our recommendations on minimum acceptable bid issues. Note that maximization of return from coal properties is not on this list of goals. In the final analysis the task force recognizes that political judgment is required to find the proper balance, and it is in this spirit we submit our final report.

In forming these recommendations the task force has "sought and applied" industry and public information and views, again, as instructed by the Secretary in his June 2, 1979, decisions on Federal coal management. Transcripts of a fair market value town meeting are being submitted with this report.

In the remainder of this section the recommendations of the task force are represented. This is followed by the background and history on the fair market value issue. All readers not familiar with this subject are well-advised to read the brief overview provided by Section II before considering the task force recommendations. Options considered by the task force are then presented in Sections III and IV. Except as incorporated by reference in Section I, the suggestions here are provided to indicate more fully the scope of the options considered by the task force, as well as to provide fuller descriptions of recommendations and guidance on their intent. These options are followed in Section V

with study papers prepared by the task force that led up to the options and recommendations. Contractor studies and a summary of public comments on fair market value are reported separately.

At the instructions of the Director, Office of Coal Leasing, Planning and Coordination, the FMV task force did not consider two important questions: the first, who will be carrying out the new procedures recommended by the task force; and the second, how will the transition to the new procedures be conducted? OCLPC's recommendations to the Secretary on these matters should be coming forward as soon as all parties have had an opportunity to fully digest the implications of this report. Cost estimates should be available then. The FMV task force recommendations will require modest changes to existing coal leasing regulations; strengthening the recent memorandum of understanding between BLM-GS-CSM, which will replace Secretarial Order 2948 for coal; and modifying the existing Departmental Manual instructions on leasing. By concurring to the FMV task force recommendations with or without change, the Secretary will be indicating his approval of making the necessary changes to these documents.

Findings

The recommendations to come are based on eight basic findings. These are:

1. The inherent uncertainty of conducting evaluations through a discounted cash flow analysis of projected mine earnings requires that this procedure be applied conservatively.
2. The government is the price leader for western coal properties due to its vast ownership of unleased, low-cost coal. All lease prices will tend to go to the level the Department chooses.
3. Supply curves for western coal types are at the present highly elastic. There are great amounts of coal available at roughly the same cost. Under this structure true economic rents will be relatively small, but probably still significant for the government's better coal properties.
4. The terms fair market value, meaning the results of a mineral property appraisal, and minimum acceptable bid have been confused in the past. Receiving fair market value does not mean getting the maximum return for coal properties.
5. Currently fair market value for many western coal properties is already obtained through bonus and royalty minimums set by the Congress and Department policy.

6. A policy of maximum return for Federal coal properties is inconsistent with meeting Federal coal leasing goals and targets.
7. Coal companies appear to be quite successful at passing through costs of coal properties to the consumer in the coal prices they charge.
8. If the Department observes excess profits or lack of competition in the post-sale market, the proper Departmental response is to lease more, not to raise reservation prices, as this yields the greatest social benefits.

Major Recommendations

The options leading to these recommendations are presented in Section III. The following options were considered by the task force:

- Modification of Present System to Enhance Appraisal Aspects
- Use of Averaging DCF with Bids Received
- Use of Flat-rate Minimum Acceptable Bid
- Use of a Reservation Price that Reflects Regional Ranking
- Exclusion of Quasi-rents from DCF Calculations
- Mixed System

The task force in June noted there were two classes of Federal tracts each with distinct characteristics—small tracts, i.e., those tracts that if mined alone could only be mined at high costs with little or no profit and tracts that were of efficient size for operation standing alone.

The task force has concluded that presale evaluation of small Federal tracts is, under existing law, an unmanageable problem by any technique other than comparable sales analysis. The task force, therefore, recommends that small and large tracts be treated differently when determining minimum acceptable bids. The task force would, for now, define small Federal tracts for operational purposes as:

1. Any tract qualifying for lease on application under subpart 3425 of the Federal coal management regulations; or
2. Any tract for which the USGS designated responsible official and the BLM-authorized officer jointly determined significant economies of scale exist if mined with adjoining non-Federal coal. Generally, significant economies of scale exist if the total cost per ton of production from the candidate small tract operated as a mining unit in conjunction with the adjoining non-Federal coal or with existing leased Federal coal were on the order of 15 percent less

than costs with the candidate tract operated alone or as a mining unit made up entirely of the most efficient block of contiguous, unleased Federal coal.

3. In addition, any small tract qualifying for lease on application because it is outside coal production regions or because it is a special hardship lease or any tract qualifying because of loss of efficiencies of scale should not contain greater than 30 percent of the unmined reserves of the probable combined mining unit.

Additional study is needed to determine the final terms of this definition. This study could be carried based largely on a cost effectiveness goal; i.e., at what size tract does the cost of evaluation get paid back from the incrementally higher return on the tract? It is anticipated this definition would class over half of the evaluations that would be needed over the next 3 years as small tract evaluations.

The task force recognizes that its recommendation on small tracts will increase the attractiveness of application leasing relative to normal leasing. A safeguard is provided in the regulations (43 CFR 3425.1-8(a)(2)) against abuses of the lease-on-application provisions. The authorized officer, by regulation, shall reject an application when it would violate the integrity of the normal leasing process. Abuses are most likely under the bypassed coal category of application leases. Bypassed coal is (43 CFR 3400.0-5(d)) "an isolated coal deposit that cannot, for the foreseeable future, be mined economically and in an environmentally sound manner either separately or as part of any logical mining unit other than that of the applicant ..." (emphasis added). The task force recommends that the Bureau of Land Management re-examine this topic in light of the increased attractiveness of small tracts and issue instruction memoranda or memoranda amendments that ensure its field officers understand the concept of integrity of the leasing process and the basis for making this judgment. Except where coal is needed immediately for production maintenance, no applications for leasing should be accepted where the possibility exists that the application lands, alone or in conjunction with other Federal lands, could constitute a mining unit or otherwise be leased through the normal leasing process in the foreseeable future.

Evaluation of Large Tracts

The task force recommends that large tracts continue to be evaluated in a manner similar to the present system; that is, the Department would continue to carry out case-by-case discounted cash flow analyses and comparable sales analyses. It recommends the following procedural changes.

1. The price used in the discounted cash flow should be the breakeven price of coal from the marginal coal mine that could enter production with new scheduled Federal leasing rather than a current price determined by market survey. Generally, the model should be run with conservative estimates of input. This price, with necessary adjustments for coal quality differences, would be applied to all large Federal tract evaluations within the lease sale area. The task force believes that at present it is highly probable this marginal price would be lower than local prices seen in the present market. The present market price is higher than marginal for several reasons, but basically due to the immediate period of energy price increases. The task force believes use of this competitive market price, with resulting lower evaluations, is justified because it will:
 - a. Avoid the government's being caught in the position of supporting high coal prices by not allowing downward movement of coal prices to competitive market levels.
 - b. Be a closer approximation of true resource rents than the rents presently available which are a combination of resource rents and transitional quasi-rents caused by major and sudden readjustments in the energy sector. Such transitional quasi-rents will exist for only so long as it takes for new mines to enter production to meet new demand for coal.
 - c. Ensure that the prices the Federal Government charges for its coal leases are compatible with its coal goals and targets.
 - d. Ensure the government would still receive significant income for its best, large coal deposits.

There are two principal approaches the task force sees as feasible for determining the competitive market price. These are determination of price through computation of the market clearing price in a national coal distribution model and determination of price by computing that price needed to cover costs plus return to equity on the marginal logical mining unit constituted from among the Federal tracts offered or a smaller market group based on mining costs. Both systems should be followed during the interim period when this approach is being introduced into use. Responsibility for computing these two prices and for continuing to study coal markets should be assigned one office. Continuing studies of coal markets would be used to provide additional information in coming to a single recommended price for use in tract evaluations and in order to maintain a check on the task force's conceptual model of the western coal market. The office given this responsibility should report back to the Secretariat

any determinations that invalidate either concepts or methodology behind the task force's competitive price recommendation. The evaluation group, in the main, for large tracts would continue to conduct business as usual, carrying out analyses and continuing to survey market prices. Market price results would provide a basis for comparison and for monitoring the size of quasi-rents during the introductory period. The existing discounted cash flow process has a capability to report values over a wide range of prices (see Figure 1).

Supply prices are typically generated using national coal distribution models together with projected levels of coal production. The prices computed by these models are the same conceptually as the competitive prices recommended for use by the task force--the break-even price of the marginal mine. Using the second method of price determination requires identifying the marginal LMU among the Federal tracts in the upcoming sale. It seems consistent to tie this identification to the Federal coal management tract ranking process, a large part of which is based on judging the relative desirability of coal tracts being considered. The marginal tract would be that tract that just satisfies the regional target, though to be more certain, other tracts above and below the marginal tract should also be included in the computation. A discounted cash flow with continuous variation of price, such as is suggested by Figure 1, would quickly show the break-even price for the marginal value tract.

2. If the Department continues to use an inflation-free discounted cash flow, it should incorporate correction factors to account for the real loss of invested capital due to too low depreciation in the DCF model (see ICF report to task force). (BLM does not concur in this recommendation because of the difficulty of predicting long-term inflation rates.)
3. The Department should adopt a procedure for evaluating discount rates used in the discounted cash flow based on a formula that recognizes changing debt-to-equity ratios, changing long-term borrowing rates, and industry pre-project rates of return. The discount rate obtained through the procedure should be continually updated.
4. A formal comparable sales analysis should be conducted on all large tracts by personnel trained in appraisal methods; further, the responsible agency should be assigned to study the use of large tract comparable sales data in the same manner as that for small tracts, i.e., a benchmark fair market value that is periodically updated.

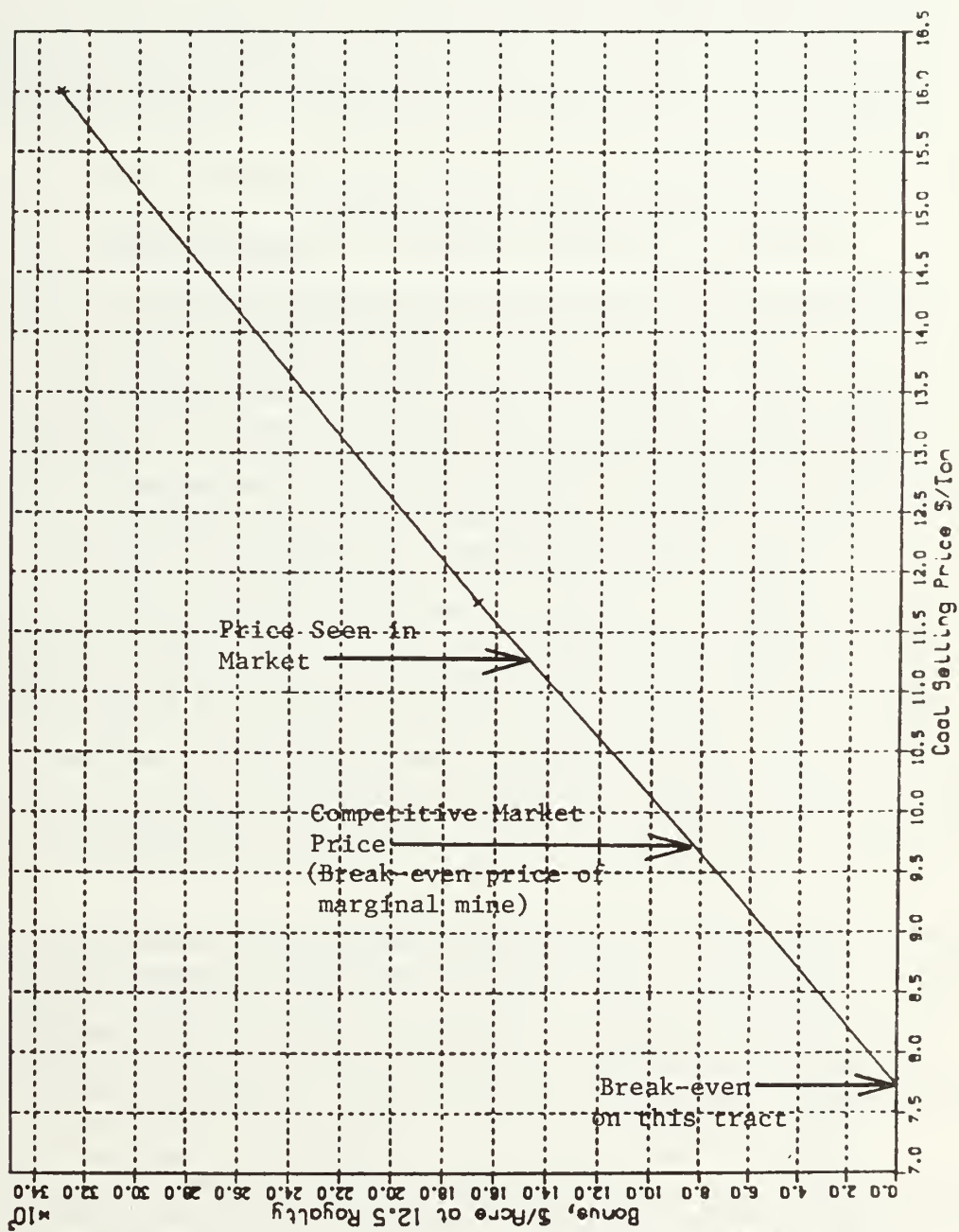


Figure 1. Typical mine value versus coal price relationship as generated by discounted cash flow analyses

5. The Department should set the large tract minimum acceptable bid at the larger of the comparable sales or discounted cash flow analysis values. These values must also exceed statutory and policy minimums in order to be considered.

Evaluation of Small Tracts

The FMV task force has determined that at the present time small tracts appear to have fair market values less than the following minimum acceptable bids (set by statute and existing Departmental policy):

\$25/acre and 12.5 percent royalty for surface coal.

\$25/acre and 8 percent royalty for underground coal.

This determination is based on the comparable lease sales data acquired for the April 1979, task force report and on data acquired for a dry run of the comparable sales analysis technique this summer (see working paper by C.E. Brownell). Only one-fourth of the DCF evaluations of small tracts on a stand-alone basis over the past 2 years yielded values greater than the basic royalty and bonus. Evaluated as viable economic units, i.e., taking into account the economies available to the applicant because of his other coal ownership, two-thirds yielded values greater than the minimum. The added return from one out of four small tracts is unlikely to repay the Department the cost of conducting the evaluations. Further, in many cases economic theory would say that without bargaining, which is excluded by law, small tracts are of zero value or just what the bidder will offer on the basis of goodwill. A final consideration is the inherent difficulties of performing discounted cash flow analyses—which are greatest for small tracts because of higher levels of uncertainty and increased numbers of assumptions. The FMV task force, therefore, recommends that in the interim for small Federal tracts the Department should, without conducting pre-sale evaluation, set minimum acceptable bid at the above minimum acceptable levels. It further recommends that:

1. The Department's designated agency should conduct a study and report every 6 months to the Secretary on comparable lease sales, beginning June 30, 1980. This report should contain sufficient data and analysis from comparable lease sales to ensure the Secretary that the Department is receiving at least fair market value for small tract leases in all regions. The report should suggest new minimum acceptable bid levels where appropriate; in this way the Secretary could continue to be assured of receipt of fair market value. The report's recommendations may recommend stratifying coal tract evaluation minimums by area of mining, general type of coal, or mining characteristic, such as overburden ratio.

2. The definition of small tracts previously described should be adopted on an interim basis; however, further study should be conducted to determine the most cost-effective definition. Metallurgical coal and tracts proposed for unitization would be evaluated using large tract techniques.
3. The Department should begin a study of acceptable minimum bids for coal mined by truck and shovel, contour mining techniques in order to determine whether the present 12.5 percent surface minimum royalty in this case is too high (specifically in the case of Southern Appalachia).

(Technical recommendations on small tracts are presented in Section IV.)

Other Major Recommendations

The following recommendations are more fully described in Section IV on "Other Options" later in this report.

1. The Department must do all it can to enhance competition in coal lease sales. With this in mind, the task force recommends that the Department proceed with a trial voluntary unitization effort on one of the Green River-Hams Fork tracts. The task force believes that a trial effort on a tract that appears conducive to unitization is the quickest and surest way for the Department to learn how to handle this function and the problems involved. Unitization by overcoming ownership patterns that appear to favor some potential bidders over others would significantly improve sale competition. It further recommends that sales procedures used in coal leasing be investigated by the Bureau of Land Management to find and apply the best sales methods for fostering competition and that the BLM investigate methods for moderating large front-end bonuses through greater bonus payment deferrals. Investigation of intertract bidding should continue. BLM studies of guaranteed access should be monitored for positive recommendations.
2. The task force does not recommend release of the Department's discounted cash flow models to the public because it would encourage attempts to second-guess the minimum bid rather than conduct evaluations, a probable source of wasteful expense; it does recommend that the assumptions made in setting major model parameters; DOI approved parameters (e.g., discount rate and price); resource data; reserve data (MER preliminary determination); and preliminary minimum acceptable bids be released to the public.
3. Many of the conceptual problems with presale fair market value findings would be circumvented by the Department's using a system of sharing excess profits realized on Federal coal tracts. The task force

recommends that such a system be studied on a schedule compatible with possible implementation on the tracts leased in the Powder River-1982 coal lease sale, but should not interfere with the sale schedule there. The Department of Energy would be invited to participate in this study.

4. The task force recommends that the Office of Coal Leasing be made responsible for the implementation of the recommendations contained in this report.

Review and Modifications to Recommendations of Draft Fair Market Value Task Force

In the "Secretarial Issue Document for the Federal Coal Management Program" 14 interim recommendations were put forward and, on June 2, 1979, endorsed by the Secretary. These recommendations are set out below together with recommendations and brief descriptions of follow-on efforts by the Fair Market Value Task Force. An "*" is used to indicate those recommendations to which a substantive modification is presented.

1. To the extent possible and in a cost-effective fashion, develop a marketplace for Federal coal leases that attracts more than one bidder per tract. Competition is the surest way to capture producer rents (surplus profits). A rent capture policy without a competitive marketplace would likely conflict with other objectives of the program, namely resource conservation and meeting the requirements of the National Energy Plan. Concepts currently under study within the Department which would likely increase the extent of competition include intertract bidding, guaranteed legal access to lease tracts, and offering Federal coal tracts in units including adjoining non-Federal coal. The results of these studies should be closely watched and the necessary support provided to them.

Comment: The need to enhance competition for Federal coal tracts has continued to be a primary theme running throughout the fair market value study (see "Other Major Recommendation"). The task force specifically recommends that the Department carry out pre-sale unitization of tracts on a trial basis. The task force has also endorsed the intertract bid sales concept at its present level of development.

(The final report of the intertract bidding task force is due in the Spring of 1980.)

- 2.* Major efforts should be made to improve present methods for evaluating small tracts.

Comment: Options for improving small tract sales are presented earlier; generally, the task force concluded that detailed evaluations

of small tracts required an unwieldy number of assumptions, and, therefore, recommends a system of flat-rate regional minimum acceptable bid levels together with a continuing comparable sale study of the proper setting for these levels. The task force did develop specific recommendations for procedural improvement of individual small tract evaluations. These are reported in Section IV and should be followed for lease modifications and for other cases where individual small-tract evaluations are needed.

3. As part of the normal process for conducting sales, public comment should be solicited on the elements of the evaluation procedures which affect estimates of FMV. These comments should be considered prior to commencement of evaluations.

Comment: Recommendations on releasing information before sales for comment are presented earlier. Release of all data is recommended (see "Other Major Recommendations"). The task force notes that while the present regulations allow comments to be "considered prior to commencement of evaluations" it is not required and has not been the case in the program to date.

- 4.* A detailed study should be made, based on industry records, of the rate at which anticipated cash flows from mining should be discounted to present value together with a study of the conceptual relationships of the risk, inflation, financial, and real return components of discount rates.

Comment: Studies of the discount rate selection for use in discounted cash flow analyses are presented in the main part of the paper and the contractor study. Rather than the uncritical use of a set number, the task force recommends a procedure be adopted for updating discount rates on a periodic basis (see Section IV).

5. The CREV income approach lease value estimate should be supplemented with a documented comparable sales lease value estimate. In each case the usefulness of market data would be determined and documented on an appraisal-by-appraisal basis.

Comment: This recommendation still applies to large tract, individual appraisals. The task force also endorses continuing studies of comparable sales lease value estimates with annual reports to the Secretary for small tracts.

6. As a priority item, the uncertainties inherent in the government's income and market approaches to evaluation of FMV should be more rigorously investigated.

Comment: The task force prepared study papers on this topic (see Section V), but, while still endorsing the need for uncertainty studies, now would only note it is a subject that should be dealt with within the operating bureaus. The task force also noted in interviews with those having operational responsibility for coal tract evaluation that, in general, insufficient time was available for studies aimed at improvement or recalibration of existing methodology. Such studies would not only result in a more vital up-to-date evaluation program, but also are needed to maintain a sound professional staff.

- 7.* Inflation of coal prices and coal mining costs should be incorporated into the DCF approach to estimating FMV. Methods should be developed to account for the effects of inflation on the elements of the DCF model, particularly the effect on depreciation tax credits.

Comment: The contractor report on methods of correcting the depreciation element of an inflation-free discounted cash flow model to avoid underestimating capital recovery cash flows is appended to the main report for the use of the operational bureaus. The task force recommends the suggested procedural changes or similar changes be made into "inflation free" DCFs. The task force notes with interest that USGS is investigating possible DCFs "with inflation."

3. Potential double counting of royalties (calculating royalties on prices which already include royalties) should be recognized in estimating coal prices to be used in DCF estimates of FMV; this could occur when the sample of market prices includes prices which include royalty passthrough components. Methods should be developed for adjusting current coal prices for applicable royalty rate where coal contracts contain royalty passthrough provisions.

Comment: This problem is symptomatic of the difficulty of using the present survey technique to find coal prices. The task force conducted no further studies on this point because its major recommendation circumvents the problem; a report by the contractor, however, indicates that royalty passthrough provisions are very common in long-term contracts involving Federal coal. Generally, the task force was very sensitive to the role of the Federal government as a price leader in the western coal industry; accordingly, it recommended new procedures for finding the coal price used in cash flow analyses to avoid monopoly rates.

9. The FMV of the damages to a qualified surface owner should be based on market value of similar surface estates and damages in non-coal areas; use of market data from non-coal areas would eliminate the consideration of royalties to the surface owner as an element of FMV of damages and costs; this approach should be incorporated immediately into tract evaluation methodologies.

Comment: The FMV task force continues to support this recommendation. A study paper on this topic is included with the new report. This recommendation has not been implemented by the operating bureaus.

10. The appraisal of FMV of all competitive leases should be documented; such documentation should not reveal any proprietary data but, otherwise, should be detailed enough to allow reconfirmation of decisions and, further, should be placed in lease case files after leases are issued.

Comment: The FMV task force continues to support this recommendation.

11. The general practice on new leases of capturing FMV through increased royalties instead of increased bonuses should be discouraged; however, it might be retained for possible application to PRLAs and possibly to readjustments and emergency leases.

Comment: The FMV task force continues to support this recommendation. The task force has not dealt with readjustment or PRLA policy. The topic of evaluation for purpose of exchanges is also specifically excluded.

- 12.*Development guidelines should be developed for a possible bid-acceptance (reservation price) procedure similar to that used for OCS sales.

Comment: This procedural option was one of the principal options examined by the task force, but it is no longer recommended.

13. Industry and public participation information and views on the fair market value process should be sought and applied to the studies recommended above.

Comment: The task force has followed this instruction. The keystone to this effort was a major public meeting on fair market value November 1, 1979, in Denver. Industry and public views are represented throughout the report.

14. The Office of Coal Leasing, Planning and Coordination (LCC) should continue oversight responsibilities for the above studies.

Comment: The task force has noted two instances above where June policy decisions have not yet been implemented in the field. Washington offices should take specific follow-up steps to all the actions adopted herein. In general, it appears that communication of the details of decisions and the issuing of instructions to implement those decisions could be strengthened.

Section II

Background and History of Issue

Background

An understanding of fair market value and minimum acceptable bids requires a sound knowledge of coal markets, the economic theories of resource extraction, the legal setting, and the policy evolution and history of fair market value and resource evaluation issues within the Department. The purpose of this section is to give those readers without that knowledge sufficient background information to understand the context of the task force's recommendations. Readers seeking greater depth of coverage of these topics should study section V of this report, the previous reports of the Departmental coal evaluation task forces; the public comment received by the task force in Denver on November 1, 1979; and the reports submitted to the task force by the contractor who assisted the task force in the final stages of its work, ICF, Inc.

According to the Federal Coal Leasing Amendments Act (FCLAA) of 1976, Federal lands offered for coal leasing must be sold via competitive bidding and "No bid shall be accepted which is less than the fair market value, as determined by the Secretary [of the Interior], of the [in situ] coal subject to the lease". Thus, the receipt of fair market value is a legal requirement in Federal coal leasing. Unfortunately, confusion has arisen about the meaning of the term "fair market value". This is partly because of its use by various authors in the literature on mineral leasing to describe what price the government should seek to obtain as a leasing goal, rather than what price it must obtain as a minimum legal requirement. Receipt of fair market value is often confused with maximization of government income from sale of its resources. Fortunately, this confusion concerning the definition of fair market value does not extend into the legal arena. The courts have established the legal definition of fair market value within the body of law dealing with the purchase or sale of property and its appraisal and the condemnation of real property by the government under the power of eminent domain.

"Under established law, the criterion for just compensation is the fair market value of the property at the time of taking. 'Fair market value' is defined as the amount in cash, or in terms reasonably equivalent to cash, for which in all probability the property would be sold by a knowledgeable owner willing by not obligated to sell to a knowledgeable purchaser who desired but is not obligated to buy".

Thus, if there is an established market price for a property, then this is its fair market value. If there is no established market price for a property, then an appraiser's estimate of the market price is used instead. In the appropriation of private lands by the Federal Government, it is the government's appraisal of the market price that legally determines the fair market value. Moreover, the FCLAA of 1976 makes it clear that the determination of fair market value is the responsibility of the government in Federal coal leasing, as well, specifically identifying the Secretary of the Interior as the government agent responsible. Furthermore, the U.S. Department of the Interior's Departmental Manual presently states that the 1973 Uniform Appraisal Standards should be used "as a guide by all bureaus and offices" within the Department and that "the appraisal standards are equally applicable to those bureaus that dispose of property on behalf of the United States" (emphasis added). Thus, a definition of "fair market value" in Federal coal leasing as "the federally appraised market price of the in-situ coal offered for lease" is fully consistent with the current legal and Departmental usage of the term, and will be our accepted definition.

There are two principal appraisal approaches for evaluating the market price of coal properties. These are the comparable sales approach and the income or earnings approach. Of the two, the comparable sales approach is, where feasible, the preferred method.

In the comparable sales method, a study of "arms length transactions in lands in the vicinity of those taken at about the time of taking" are made. This method is greatly preferred because "it is the only approach to value that reflects the balance of supply and demand in the market place."

In the income or earnings approach, the worth of an investment-type property is estimated via a discounted cash flow (DCF) model of projected future net earnings. Note that this method goes not usually account for the uncertainty of the earnings ever occurring, which reduces the property's value. Federal coal leases are investments of the type that can be evaluated with this approach. In this case, the price of produced coal and the cost of production can be used in a discounted cash flow model to estimate the net present worth of the Federal coal lease. This is, in fact, the system presently in use by the Department; for reasons debated by representatives of USGS and BLM, comparable sales analysis has not been applied successfully to Federal coal lease evaluation.

Within the context of public takings, the fair market value of a property is not subject to control by the "seller," but is based on observations of previous similar transactions in the existing private market. However, within the context of Federal coal lease sales, the fair market value is subject to control by the seller, the Federal government. The government can design its coal lease market to reduce some of the anti-competitive distortions that exist in the private coal lease market to the point where prices generated in the Federal market may generally exceed those in the private market.

Economic Rent

"Economic rent," sometimes referred to as "producer surplus" or "excess profits," is a term that comes from classical economic market theory. In coal property evaluation, economic rent is the present value difference between the market price of the mined coal and the costs, including normal returns to capital, of producing the coal. It can also be thought of as the excess return to a factor of production beyond that needed to bring it into use. The importance of this concept is that under ideal market conditions with no uncertainty, the market price of a Federal coal lease would be equal to the economic rent. This is the value bidders should willingly offer for a lease.

There are various sources of "rents" and "excess profits" which could potentially be captured through bonuses and royalties.

- (1) Transition and monopoly rents (also called quasi-rents) caused by restricted federal offerings or rapid shifts in demand due to unforeseen changes in the energy sector. The Department should not artificially restrict supply, but to the extent that the first new sales will result in prices that are intermediate between present and long-term price levels, some portion of the excess profits would be captured under the present DCF evaluation procedures but not under the recommended procedures. Unfortunately, since the Government is potentially a price leader and because of the way appraisals work, tract values could get stuck at high levels.
- (2) Exhaustible resource rents. These resource rents are due to scarcity and would be available in a competitive market, unlike those above, and should go to the resource owner. They should be small for coal.
- (3) Location rents. Some coal is closer to existing rail lines and to points of end use and hence of more value because of its location.
- (4) Rents due to differences in quality of coal

- (5) Rents due to differences in cost of production between mines within the same market area.
- (6) Rents due to differences in cost of production within a mine. Where two or more seams of coal are extracted in one mining operation, it is likely that they have different costs of extraction. The most costly seam will have a cost less than or equal to its market value. Less costly seams in the same mine can produce substantial economic rents. The Secretary's decision on maximum economic recovery was essentially a decision not to capture these rents.

The rents captured by the Department under the recommended new system for large tracts are type (2), (4), and (5). Under the existing system the Department might capture type (1) rents as well. Location rents are generally not reflected in the present method of rent evaluation, but would be included to some extent under the recommended large-tract evaluation system.

A number of analysts have recommended that an ideal Federal mineral leasing system would maximize the economic rent of the mineral leases, and would capture this entire economic rent for the public. Maximization of the economic rent is argued to be in the interest of national economic efficiency. Capture of the entire economic rent is argued to be the natural goal of a proprietor seeking the highest possible price for the use of his land, and, some analysts argue, the Secretary should manage Federal coal lands as if he were a private proprietor.

The commonly cited recommendation that the government should seek to capture the entire economic rent should be qualified in the case of coal leasing. First, the Department has potential monopoly powers; it can control prices for leases by the rate at which it releases coal to the market. Clearly these powers should not be used to maximize rent. Stated differently the Department should only consider capture of true rents, not of quasi-rents. Another policy argument is based on classical economic theory, which suggests that economic rent is a surplus, whose capture would not affect output decisions or the selling price of the produced mineral. However, capture of the entire economic rent, where the rent is measured based on the price of coal seen in the market prior to the lease sale and might include market price power, removes the potential for Federal coal producers to underprice their competitors as a market-entering strategy. In other words, where rents exist in a system for the producer, there is an opportunity for prices to go down. Where there are no rents for the producer, this opportunity exists only to those willing to accept less than normal rates of return. So in a dynamic sense, rent capture by the government can cause prices to become stuck at high levels.

Recapping, then, in Federal coal leasing, fair market value refers to the federally appraised market price of the unmined coal offered for lease, and represents the lower bound on the minimum acceptable bid the government can legally accept in exchange for its property. The maximum the minimum acceptable bid can be set for is the coal's economic rent. It is defined as the present value difference between the market price of the mined coal and the cost of producing the coal. Under an ideal market it would not include monopoly price efforts. The price a willing buyer should offer for a Federal coal lease would be equal to the economic rent, though he will certainly attempt to buy for less through the use of his bargaining power.

Several of the assumptions behind the above simple economic model do not hold in the real world. Inevitable non-ideal market conditions due to uncertainty will cause the actual market price of a Federal coal lease to equal, on the average, the expected present value economic rent, i.e., the rent with odds of successfully marketing the coal factored in, less the bid preparation costs expended to win the lease. Because this represents the highest price at which a Federal lease would still be favored over alternative private investments, it is the true upper bound on the amount the government can endeavor to receive through the minimum acceptable bid for its leases. Also, bidder should recapture their bid preparation cost for all sales through those sales in which they are successful.

Another difficulty in using the model uncritically is that it assumes a larger number of bidders. Although there are numerous potential bidders for each Federal coal lease, in most cases there is only one actual potential bidder. This is particularly true of the smaller tracts. The scattered or checkerboard pattern of coal (and surface) ownership in parts of the West, in combination with the large coal deposit size needed to achieve coal production scale economies, often causes Federal coal to be of value only to one potential bidder the owner of the contiguous coal deposit. Potential solutions to this problem include presale unitization, i.e., the selling of the Federal coal along with nearby private coal in units large enough to achieve coal production cost efficiency; and intertract bidding, wherein the high bidder wins the right to produce his most favored lease of those offered by the government. Other possible government actions that would tend to create a competitive environment by increasing and equalizing lease value among potential include: requiring transferable surface owner consent; guaranteeing access rights roads, etc.; and governmental brokerage of coal contracts to reduce price and contract uncertainty.

Besides the legal requirement that fair market value must be received, there are several Federal leasing goals which may be relevant to Federal coal lease pricing policy, including: promotion of national economic efficiency in the development of the resource; an equitable sharing of the rent from production of a lease between the public and producers; environmental protection; socioeconomic responsibility; and national security (national energy supply) considerations.

Thus, while it has been suggested that it would be in the interests of economic efficiency and equity to pursue as leasing policies the maximization of competitive-price lease rents and the capture of these rents by the Federal Government, for Federal coal leasing, the force of competing policy goals requires the rent capture goal to be modified to exclude rent-capture methods that would increase the price of produced coal or cause that price and thus the supply to become established at monopolistic levels.

Key Issue In Federal Coal Lease-Pricing Policy

This section distills the key findings on which the policy recommendations of the task force are based. The most important of these is that there appears to be a significant difference between the current long-term-contract price for mined coal and the estimated price at which coal on the best Federal coal lands, which are soon to be made available to the market, could be produced. This appears to be true even in the face of a still significant amount of leased, but not producing Federal coal (see Table 1). These existing leases do appear to be coming into production rapidly. As Federal coal leases become available in increasing number,

Table 1
Status of Leased Coal, 12/4/79

	<u>Number of Tracts</u>	<u>S.Res</u>	<u>U. Res</u>	<u>Number of tracts Oil Cos Ownership*</u>	
Leases in Prod.	177	3.17 (27.8)	1.09 (21.2)	51	29%
Leases with approved plans, no prod.	44	.49 (4.3)	.24 (4.7)	16	36%
Leases with mine plans submitted, not approved	72	3.09 (27.1)	1.17 (22.7)	48	67%
Leases without mine plans	245	4.65 (40.8)	2.65 (51.5)	87	29%
Total	538	<u>11.40</u>	<u>5.15</u>	202	(39%)
Grand Total		16.55			

Notes:

1. () indicates percent of total.
2. Total oil cos reserve lease holdings = 10.34 billion ton (62%).
3. The Department now has clear production indications on 59.2% of surface coal and 48.5% of underground coal. There were 223 leases in mine plans or with pending mine plans at the time of the Federal coal management program Final EIS (April 1979), that number has increased to 293 in the intervening period.

the selling price of mined coal should drop as competition for coal production contracts drives higher cost coal from the market. Ultimately, because of the vast supply of low cost Federal coal, the contracted coal price should again approach, as has been historically the case, the unit cost of production plus a minimal, competitively-determined rate of return on capital invested in coal production, with relatively small excess profits (rents) in the system.* The key issue facing the Department is what Federal coal leasing-pricing policy would be best to follow during this period of predicted decreasing real contracted coal prices during which transition and monopoly rents may possibly exist on Federal coal leases.

It is generally accepted Department policy to lease too much rather than too little facing an uncertain future, the task force in its recommendations has followed the analogous rule for minimum acceptable bids for the following reasons:

- Regardless of the degree of excellence of the government's discounted cash flow coal lease rent-evaluation model, the correctness of the government's estimates of lease rents will be, at best, uncertain. This is because the size of the rents is very sensitive to the f.o.b. price resulting from the lease sale -- and this price is very uncertain. Also, in computing rent you are finding a small difference between two large numbers which magnifies the effect of uncertainty. Unfortunately, satisfactory f.o.b. price-prediction models do not exist and are unlikely to be developable since the instability of the estimate is inherent in the problem structure. Because of this, the government's estimates of lease rents could conceivably be off by order of magnitude with only slight changes in input. There have been recent instances of nearly side-by-side estimates only a few months apart that produced royalties in one case of 21% and in the other of the statutory minimum.
- Further, it is likely that any high lease prices used would, rather than resulting in sale failures, pass through to the consumer. Also, whatever reservation prices are set will always appear to be correct. The degree of error in the government's estimates of lease rents used to set the reservation prices will not be revealed because bidders will tend to pay whatever reservation prices are set. This is because of the control the Federal government has over a major part of the supply of the best western coal. As long as the reservation price is less than the difference between production cost plus a minimal return on investment and the negotiated contract price, it can be paid and the resource produced profitably. However, the f.o.b. price of such coal must be accordingly higher than it would be with lower reservation prices, a price that will eventually show up in consumer's electric bills.

*Electric Power Research Institute Report EA-497, "Coal Price Formation", December 1977.

- Once high reservation prices and royalties are used, they may be locked into the system for an indefinitely long period, effectively halting movement towards the equilibrium coal price. Also, once obtained, high reservation prices could set a precedent for fair market value determinations based on comparable sales in future Federal and non-Federal coal lease sales.
- In theory at least, social welfare maximization occurs at the point of competitive equilibrium of national coal supply and demand. At this point, the greatest amount of coal will be produced at the lowest possible cost and the contract price for coal will equal its production cost plus a minimal, competitively-determined rate of return on the capital invested in coal production. For large tract evaluation the task force has recommended use of this price rather than the estimate of current coal price.
- The task force recommendations generally puts the Department in the position of relying more on the market to set the value of the Federal tract and include steps to enhance competition in lease sales.

The basic weakness of the traditional royalty and reservation price set on the basis of existing prices of the time of evaluation is that it assumes that the price of the produced mineral is insensitive to the manner in which it is leased in-situ by the government. While this is a reasonable assumption for the leasing of Federal oil and gas properties, it appears to be inappropriate for the leasing of Federal coal properties. The rate of offering and method of pricing of Federal in-situ coal will have a dramatic effect on coal prices. Acknowledgment of the dynamic, interactive nature of Federal coal lease-pricing methods and coal prices is essential to recognition of a superior Federal coal lease-pricing policy.

The Federal government should rapidly offer Federal coal tracts in each region to clear the regional markets of higher cost nonFederal coal. The goal is to generate quickly postsale markets wherein coal prices would be determined based on the extraction costs of the new low-cost Federal coal with all rents squeezed into lower prices. The Federal government should work to ensure that coal from Federal leases is contracted to be sold at cost plus only a reasonable return on investment. One policy tool for such action is that the Federal government can require in its leases that produced coal be sold at "reasonable", i.e., presumably not exorbitant, prices. Due caution is advised here, though. It is best to rely on a competitive postsale market to determine what is a "reasonable" price or a reasonable return on investment. Increased direct purchase and production of Federal coal leases by utilities is always an available option. We should expect that these factors will work to very quickly pull coal prices in line with the lower production costs on new Federal coal.

If the coal price is not expected to drop immediately to a cost-based equilibrium, by not utilizing reservation prices in an attempt to capture directly the monopoly and transition rents which would temporarily exist, the Federal government would obtain several benefits beyond that of allowing for further unrestricted downward movement of the coal price. First, the administrative cost of detailed tract evaluations would be saved, which is one of the main reasons for the task force's flat-rate system recommendation for small low-value tracts. Second, approximately half of any excess profits that result, including excess profits on private coal developed in conjunction with the leased Federal coal, will be captured via Federal corporate income taxes. (The task force also recommends investigation of a profit sharing system.) Third, several beneficial types of industry behavior may result. Firms are encouraged to buy Federal coal leases in order to capture these rents, which would tend to raise the level of competition and the bid levels for offered Federal coal tracts. Also, the temporary existence of monopoly and transition rents should induce a greater number of outside firms to enter the coal industry, strengthening its general competitiveness and resulting eventually in a lower competitively-determined "normal" rate of return on investment in the industry and lower prices to consumers than would occur in a less well-realized competitive market equilibrium.

Based on these observations and consideration of what policy on minimum acceptable bids would allow for unrestricted movement of the coal price towards its competitive equilibrium-determined minimum while ensuring the government a large share of the residual rents in the system leads to the policy suggestions contained herein.

History

The history of fair market value and economic evaluation of Federal coal resources for lease sales is based on a series of laws, judicial decisions, policy statements, documented procedures, and task force reports.

The need for pre-lease economic evaluation of coal leases has its basis in the Mineral Leasing Act of 1920, which changed the procedure for acquisition of coal mineral rights from outright sales to leases. Early efforts to insure reasonable value for sale of coal looked to the Federal Property and Administrative Services Act of 1949, whereby coal, in lands reported as surplus according to 30 U.S.C. 352, was disposed of by the General Services Administration. This act authorizes disposal of surplus property by sale, exchange, lease, permit or transfer for cash, credit or other property on such terms as the Administrator of the GSA deems proper. These terms specify advertisement for bids in such a manner as shall permit full and free competition consistent with the value and nature of the property involved. Exceptions to these terms include national emergency, public health and safety, uncompetitive bidding and situations in which fair market value can be secured through negotiations.

Also 31 U.S.C., promulgated in 1951, provides (483):

"It is the sense of the Congress that any work, service publication, report, document, benefit, privilege, authority, use, franchise, license, permit, certificate, registration or similar thing of value or utility performed, furnished, provided, granted, prepared, or issued by any Federal agency *** shall be self-sustaining to the full extent possible, and the head of each Federal agency is authorized by regulation ** * to prescribe therefor such fee, change, or price, if any, as he shall determine, in the case none exists, or redetermine, in the case of an existing one, to be fair and equitable taking into consideration direct and indirect cost to the Government, value to the recipient, public policy or interest served and other pertinent facts;..."

In September 1959, the Bureau of the Budget (now OMB), in Circular No. A-25, stated that fair market value should be obtained where federally owned resources are leased or sold.

Coal leasing during the period of 1955 to 1970 was accomplished on a reactive basis, case-by-case, without any consideration for the total coal reserves under lease or the need for additional leasing, and the environmental impacts of leases were not addressed. Prevalent feeling was that the bonus bid was a token payment and that true market value was actually realized by royalty payments. Bonus payments on the order of \$1.00 to \$10.00 an acre were common and were believed to be all the traffic would bear. Estimates were subjective, based on comparison with other sales and the experience of Area Mining Supervisors, USGS.

At the opening of the 1970 decade, some lease sales in Wyoming coal fields experienced rather large increases in bonus bids. The Secretariat issued guidance to the Survey to make adjustments to bonus bid evaluations. In response, the Conservation Division developed the K-factor formula, which is a simple empirical method of assessing historical sales to arrive at a pre-sale estimate of coal resource value. It fell into disrepute because the value in the equation became outdated and because it was seen as relying too much on arbitrary judgements in setting "K".

In October, 1972, Secretarial Order No. 2948 entitled, Division of Responsibility Between the Bureau of Land Management and the Geological Survey for Administration of the Mineral Leasing Laws-Onshore" was issued. Among its stated purposes was that fair market value be received for leased mineral resources in addition to other provisions, of which two are pertinent:

Section 3(c), quoted below, was the authority for tract resource evaluation-rules for competitive lease sales.

"Competitive Lease Sales. The Bureau of Land Management advertises and conducts competitive lease sales. The Geological Survey's resource evaluations will be used and the Geological Survey will have representatives at the sale and readers a post-sale recommendation to BLM regarding acceptance or rejection of the bids, which must be confirmed in writing."

Section 4 also delegated responsibility to make evaluation reports for purposes other than competitive lease sales, e.g., exchanges.

"Mineral Reports. The Geological Survey is responsible for preparing and submitting to the Bureau of Land Management mineral classification and evaluation reports with respect to the leasable mineral value of lands within proposed exchanges, withdrawals, sales, land entries, or other disposals and all other land transactions. The Geological Survey, upon request, also prepares and furnishes mineral reports and other information to the Bureau of Land Management needed for its use in long-range multiple-use planning or inventory of the public lands."

In 1970 a report from BLM entitled "Holdings and Development of Federal Coal Leases" showed that, while coal leasing had increased about tenfold since 1945, production had dropped 2.5 million tons per year. A coal leasing moratorium was effected by the Secretary in 1971. This action was followed by a moratorium on coal prospecting permits in 1973. In an official news release announcing a new coal leasing program on February 17, 1973, the Secretary of the Interior stated one of the goals would be a fair market value return for resources sold. Continuing through 1976 a few coal leases were issued.

Development of coal resource economic evaluation procedures now employed by the Geological Survey began in late 1975 in response to criticism directed at the then existing evaluation procedures. This newer method is based on an income approach utilizing discounted cash flow (DCF) procedures, and includes the use of comparable sales.

The development efforts were carried out by two task forces within the Conservation Division, USGS. The first task force defined the scope of work, and the second task force developed and documented the operational procedures, including data sources, costing methodology, and a computerized discounted cash flow program, which was completed in December, 1976.

During development of the procedures, two proposed competitive coal tracts were evaluated and some preference right lease applications were assessed using the partially documented procedures. Both competitive tracts were made available for sale. A Freedom of Information Act request for release of the resource estimates and value data on the first proposed lease sale was made by Mr. Frank Pitman, an industry news reporter; the request

was declined by the Conservation Division. This action was followed by an unsuccessful appeal to the Department which was later remanded to the courts. The Judicial decision of the court decreed that tract economic data could be withheld until a decision to award the lease or not to lease the tract was made.

During 1976, the Conservation Division authorized personnel and budget for the establishment of an Economic Evaluation Unit, as part of the Manager's Staff, Central Region, Conservation Division.

Economic evaluation is structured as a three level function: 1) resource determination by the appropriate Area Geologist; 2) mining method and mine design by the appropriate Area Mining Supervisor and 3) costing and economic evaluation including tract value determination by the Economic Evaluation Unit. The tract results are assessed by a 3 member committee that determines the values to be forwarded as a GS recommendation to the State Director, BLM, for his use in arriving at fair market value. While the State Director theoretically has discretion as to the use of the GS derived values in determining fair market value, there are no recorded cases where the final decisions were not based on the GS values as received. Recently, the Conservation Division has moved to initiate two more evaluation offices in the west.

Coal commodity prices and the discount factors were recognized early as critical components of the coal resource economic evaluation. Accordingly there was much discussion within the Geological Survey and between the Survey and the Department on the rationale and procedures for deriving these values. The prescribed solution to date has been the assignment of a specialist in the Economic Evaluation Unit to estimate coal commodity prices for each lease sale. Discount factors have been based on values prescribed in a 1977 memorandum from the Staff of the Director, USGS, which in turn reflects policy established by the Office of Management and Budget.

The Department's coal leasing program was stopped by a challenge of the programmatic environmental statement in the NRDC vs. Hughes suit filed in U.S. District Court on October 21, 1975. On June 14, 1978, a partial settlement of the suit was approved. Specifically,

The agreement embodied in the amended order permits leasing under any of five standards: by-pass leases, employment leases, ERDA project leases, lease exchanges, and seven specified hardship leases. The agreement allows the processing but not issuance of the 20 noncompetitive (preference right) lease applications having the least environmental impact. Finally, the Department was permitted to process, but not issue, a lease based on an application by the Edison Development Corporation.

The conditions imposed on the tracts evaluated to this point have specified that the leases would be granted to applicants (i.e., operators) on a hardship basis with existing properties whose reserves were inadequate to meet contractual commitments. The implication of this decision was that the quantity of reserves did not necessarily reflect good coal resource management techniques and were marginally adequate to support a mine.

In a two-year period (1976-1977), the statutory base for the management of Federal coal was greatly expanded by enactment of: the Federal Coal Leasing Amendments Act of 1976, the Federal Land Policy and Management Act of 1976, the Surface Mining Control and Reclamation Act of 1977, the Department of Energy Organization Act of 1977, and the 1977 Clean Air Act Amendments.

The Federal Coal Leasing Amendments Act of 1976 (FCLAA) provides for public input on fair market value and specifically mandates that:

"No bid shall be accepted which is less than the fair market value, as determined by the Secretary, of the coal subject to the lease."

Efforts to assess the procedures, statutes, judicial decrees, policy statements and reactions by the public and lessees have resulted in the formation of three Task Forces over the past two years.

The first Task Force consisted of U.S. Geological Survey and Bureau of Land Management personnel; it resulted in the report "Tract Evaluation Task #155 Issue Paper" May 1978. In an effort to address unresolved issues a second Task Force composed of DOI, DOE, GS, and BLM personnel was established which resulted in the report "Fair Market Value of Federal Coal Concepts and Procedures" in April 1979. The substance of this report was included in the Secretarial Issue Document released in 1979 as a section entitled "Summary and Recommendation of Draft Fair Market Value Task Force Report", which consisted of 14 recommendations to further study and possible changes in procedures. The need to resolve these issues resulted in instruction from the Under Secretary on June 25, 1979, to form a new study group. This third Task Force, composed of GS, BLM, DOI and DOE personnel, assisted by outside consultants has provided issue papers, briefing papers and held a public meeting. The purpose of the meeting, held in Denver, November, 1979, was to present the evaluation issues to the public and obtain their input. These background papers and briefing papers have been submitted to the appropriate Department Bureaus and Offices for their comments.

SECTION III: MAJOR PROCEDURAL OPTIONS CONSIDERED BY TASK FORCE

The major procedural approaches to determining minimum acceptable bid considered by the task force are summarized in this section. These options are:

1. Modification of present system to enhance appraisal aspects of evaluation and modification of discounted cash flow (DCF) procedures to match appraisal concepts.
2. Use of a procedure of averaging of the pre-sale estimate of value with bids received so that more weight is given to bidder's evaluation of the tract.
3. Use of a flat-rate minimum acceptable bid with appropriate stratification.
4. Use of a reservation price that reflects regional ranking by reducing DCF economic rent estimate (more desirable tracts from environment and social viewpoint would be lower priced and uncertainty would be taken into account).
5. Use of conservative DCF calculations that exclude quasi-rents which may appear to exist only because of temporarily-constrained Federal coal supplies within a region.
6. Use of a mix of options 3 and 5 for small and large tracts.

Additional analysis and background is provided in the references cited. Note that the task force did not consider the status quo an acceptable option at the time these major procedural options were crafted.

FAIR MARKET VALUE BRIEFING PAPER: Option 1

Question: Should the minimum acceptable bid for Federal coal leases be established through enhanced use of appraisal techniques for determining fair market value and modification of DCF procedures to match appraisal concepts?

Background: The laws and regulations authorizing and governing sales of Federal coal leases provide that such leases shall not be sold at less than fair market value. Fair market value is an appraisal term. There are numerous public land laws and other Federal statutes governing sales of public lands or resources and government property, and acquisitions of private lands or interests in private lands which serve as precedents for prescribing a logical method of establishing minimum acceptable bid. These laws provide that the sale price (direct or non-competitive sales); minimum acceptable bid (competitive sale); offering price or purchase price (negotiated acquisitions); or deposits with Courts (declarations of taking in condemnation actions) shall be the fair market value as estimated by appraisal. Minimum acceptable bid can be set higher than fair market value; however, under this option they would not be. Presently, comparable sales analyses and discounted cash flows are performed by personnel without training in appraisal concepts. The DCF evaluation of tract through value-in-use violates appraisal standards. Comparable sales have rarely been applied under the existing system, perhaps because of inexperience in this area on the part of those responsible.

Analysis: Establishing the minimum acceptable bid in this manner:

- A. Eliminates the need to have a pre-sale or post-sale panel go through any additional manipulation process to determine which bids should be accepted.
- B. Add credibility to the sale process by following accepted appraisal procedures recognized by industry and courts.

Comparability of Federal with private coal sales can, however, be challenged generally on grounds of differences in the quality of information available to the seller and perceived differences in administrative burden. Field tests failed to demonstrate workability of comparable sales approach. Because of Federal price leadership position in western coal States, circular appraisal reasoning, where new appraisals are merely reconfirming old appraisals, is a problem.

References:

1. "Process of Establishing Minimum Acceptable Bids on Federal Coal Leases," Nov. 1979, C. E. Brownell, BLM/DFC

2. "Dry Run of Comparable Lease Approach to Estimating Fair Market Value of Federal Coal," Nov. 1979, C. E. Brownell, BLM/DFC
3. "Comparable Lease Approach to Estimating Fair Market Value of Federal Leases," Nov. 1979, C. E. Brownell
4. "Uniform Appraisal Standards for Federal Land Acquisitions," Interagency Land Acquisition Conference, 1973.

FAIR MARKET VALUE BRIEFING PAPER: Option 2

Question: Should a procedure of averaging the pre-sale estimate of value with bids received be adopted for setting minimum acceptable bid levels?

Background: Bid averaging would be a step towards greater reliance on the auction, itself, to set the tract reservation price. Arguably, the market provided by the auction is the best source of fair market value information. One of the steps taken by the FMV task force to identify new approaches to fair market value determination was to seek advice from a panel of five outside experts. From these five experts one, James B. Ramsey, Chairman of the NYU Department of Economics, offered a suggested new procedure. Ramsey, whose views seemed to be generally shared by the other panel members, argued strongly that the Department, because of its assumption that coal auctions would not be competitive, was trying to second-guess the "fair" market price through its discounted cash flow evaluations. It would, however, never really do well in such efforts because government project evaluators do not face the same behavioral rewards and penalties as those persons preparing coal company bids and risking coal company investments. Further, the Department gets its information on the market (prices realizable) indirectly, rather than directly through face-to-face contract negotiations. (The same can be said of estimates of rates of return).

Rather than sophisticated but "probably unworkable" analyses aimed at deriving a minimum acceptable bid, Ramsey suggested that the Department offer coal leases with minimum acceptable bids set at minimum mandated levels (somewhat as is suggested in the flat rate minimum option following).

He did not, however, think the Department should rely entirely on a competitive market developing that would bring the public the proper return for its coal. He suggested instead that the Department use the simple device of declining to consummate lease sales at auctions where fewer than, say, five bids are received.

Analysis: Setting FMV policy without testing Ramsey's forecast that more competitors will show up for Federal coal lease sales than the Department has assumed is clearly risky at this time. If future experience shows that sales with only one or two bidders participating are rare, Ramsey's suggestion might then be reconsidered. As a compromise, the task force considered as an option setting minimum acceptable bid based on an average of the pre-sale estimate of value as estimated by other recommendations herein, and coal bids received on the tract. Thus, as more bids are received the government's reliance on its pre-sale evaluation would decline. A similar approach has been used successfully on the Department's OCS sales. As is done for OCS, the Department would average to find

the minimum acceptable bid if three or more independent sealed bids were received; if one or two bids were received the Department would decline to use the averaging criteria. This option is compatible with pre-sale evaluations from the options for a modified-present-system approach with enhanced appraised efforts, a reservation price approach, and the revised DCF coal price approach. It is incompatible with the flat rate minimum proposal or intertract bidding systems. The major advantage of this option is that it gives the Department flexibility to rely on market information received at the sale. The more information received, the more weight it is given, vis-a-vis the pre-sale estimate. Among its disadvantages are that it may provide some incentive for collusion among bidders and that it might result in some delay in announcement of winners and, thus, tie up funds that would be used in bidding for other tracts. Also, it could be seen by some as finagling with the bid acceptance rule by the government to get a sale after the fact. The average number of bidders on coal lease sales between 1965 and 1975 was 1.9. Averaging to find the minimum acceptable bid, to some extent, represents a halfway position between attempting to capture DCF estimated full rent (status quo) and the flat-rate, minimum level proposal.

References:

1. "Observations on Fair Market Value," ICF, Inc., Report presented to the Fair Market Value Task Force, Department of the Interior, December 1979.
2. "Proceedings of the Town Meeting on Fair Market Value of Federal Coal Leases," Department of the Interior, November 1, 1979.

FAIR MARKET BRIEFING PAPER: Option 3

Question: Should pre-sale minimum acceptable bid values of coal leases be standardized with appropriate stratification, e.g., by coal supply regions, coal fields, or coal type?

Background: Leases in areas containing coal of comparable quality, with similar mining methods and equivalent access to markets tend to have the same per-unit value. Private leases examined by task force members indicate this value is lower than the Congressionally established minimum in many cases. Under this option pre-established fixed tract values would be applied to the regional production regions according to a schedule that was periodically readjusted. The only purpose of this schedule would be to ensure the Department's receiving fair market value. Maximization of income by setting higher minimum acceptable bids would be abandoned by the Department. Additional stratification of coal prices by coal fields, coal tract size, etc., would be used as needed. Periodic determination of the level of interregional tract fair market values by broad comparable sales analyses would provide the basis for the minimum acceptable bids for the tracts offered. There would be no case-by-case evaluation needed other than determination of coal reserves and type. The Department would put its reliance on sale competition to capture high rents. The difference in tract values within a region (intra-regional rents) could also be captured using a profit sharing system if they were not captured at the sale because of low bidder interest. Each area would be continually re-evaluated on a set schedule so that the fair market values would be current and the Secretary could be assured of meeting the statutory mandate. These studies would result in annual reports to the Secretary.

Analysis Overview: An areal basis for determining in situ values is consistent with the comparable sales approach. It avoids any reliance on discounted cash flow analyses, which appear to be extremely sensitive to input parameter estimates. This option would reduce tract uncertainty of sale and possibly enhance competition among potential bidders. Enhanced competition would result in higher bids.

1/ Towle, C. L. "Proposal for a Flat-Rate Minimum Acceptable Bid," November 1979.

2/ "Observations on Fair Market Value" (draft), ICF Inc., November 1979.

3/ "Analyzing Profit-Share Leasing," Resource Planning Assoc., Inc., Washington, D.C., August 7, 1979.

This option should assure that the tracts with the lowest resource extraction costs will attract the most bidder attention since they will have all their rents potentially available to the winning bidder. The possibility of a no-sale result on the best tracts would be less than it is under any other option here since all the other options take at least some of the stakes off the table before the sale. The tracts that are not as good as the others being offered would have a correspondingly greater chance of not selling. This option would work quite well with an intertract sales system.

This option acknowledges risk and uncertainty in coal development and production and the uncertainty of the government's estimate of value, a central theme of industry comment to the task force. Marketing and development uncertainty as well as uncertainty about input parameters to which the DCF result is very sensitive, pose, some would say, insurmountable difficulties in determining coal resource values a priori. They are not explicitly accounted for under the status quo.

If a large number of tracts are offered by the Department, with or without intertract bidding, this approach makes it feasible to evaluate them, since the economic evaluation work is much less time consuming. The government would avoid costly evaluations on tracts where there is little chance that its income increment received because of the evaluation would repay their administrative costs. The government would not be required to collect financial information on the myriad of factors that must be considered to fully evaluate a tract. Since evaluation work is essentially independent of the number or size of the tracts, the budget and personnel for economic evaluation are minimal. The task force recommended the Department adopt this option for use on "small" tracts with later addition of profit-sharing if further study shows it to be feasible (see Section I).

References:

1. "Fair Market Value, Economic Rent, and Federal Coal Leasing," D. Bieniewicz, Section V herein.
2. "Notes for a Proposal for a Flat-rate Minimum Acceptable Bid," C. Towle, (Section V herein).

FAIR MARKET VALUE (FMV) BRIEFING PAPER (Reservation Price): Option 4

Question: Should a reservation price system be used that is based on modification of economic rent estimate to account for uncertainty, socio-economic factors, etc?

Background: Under Secretarial Order 2948, the Geological Survey (GS) has the responsibility to make an estimate of the economic rent. This value is then used by the Bureau of Land Management (BLM) to assure receipt of FMV. Currently, the GS makes its estimate using a computer DCF model, the coal resource economic value (CREV). Under current short-term leasing criteria (STLC) sales, BLM generally accepts the value generated by the CREV as the minimum acceptable value (reservation price) in assuring receipt of FMV. If a bidder makes a bid at or above the reservation price under that consideration, FMV is achieved and the lease issued. This method does not recognize that various socio-economic factors (impact on local economy, and relocation of jobs, etc.) that may require taking some price less than an economic rent as a preferable choice nor does it recognize uncertainties in the process of going from lease to operating mine.

Analysis: The question that would be resolved is what, if any, modification must be made to our current procedures aimed at obtaining FMV to accomplish a fair and equitable exchange of monies for resources under the up and coming coal leasing sales. The answer to this problem is dependent on what the Department determines is fair and equitable (i.e., the best thing to do). Two extremes can define the boundaries of an infinite number of scenarios to what is fair and equitable as applied to coal FMV. The one boundary scenario would achieve the extreme of getting coal into the market place at the lowest possible price, thus resulting in a lowering of cost to the American public of coal-generated energy; however, a lesser return in revenue (via bonus) to the Government would be realized (Option 3). The other boundary scenario would achieve the highest return of revenue to the Government for the coal and also result in probably the highest cost to the American public for coal-generated energy (status quo and slow rates of leasing). The question is which boundary scenario or intermediate scenario does the Department consider fair and equitable. Methodology and procedures for determining the reservation price to achieve that fair and equitable transaction is not difficult, but a policy decision as to how much less than economic rent the Department considers fair and equitable is necessary. (See statement of goals in Section I.)

Once a decision is made on the scenario option desired, the Government would become an active player in determining FMV. Reservation price would be set for each tract to be offered based on the selected option and its inherent reduction factor (IRF) (how much less than economic

rent the Department is willing to accept due to its estimates of uncertainty), the socio-economic rank of the tract to be offered, and the estimated economic rent.

The functional form of the reservation price would be KG , where G is the Government's rent estimate and K , ranging $0 < K < 1$, is a multiplier which is dependent on: (1) the desirability of leasing a particular tract over other tracts due to socio-economic impacts (from the regional coal team); (2) the desirability of leasing versus not leasing coal to meet regional production goals; (3) the IRF; (4) the discounted value of losses due to bid rejection; and (5) any additional considerations that may be warranted.

Let us examine how K would depend on these factors. For example, as the number of bidders (i.e., the evidenced competition) went up, more dependence could be placed on the market to force the rent to be bid away, and less dependence would need to be placed on the Government's rent estimate (G). Thus, as the number of bids increases, the multiplier (K) should decrease.

In another example, as the uncertainty in G increases (as measured by its variance, where G is a point estimate of the rent such as the mean), then the chance that the Government has made a wrong estimate of actual rent increases. Thus, as the variance of G increases, to reduce the risk of inappropriate bid rejection, the multiplier (K) should decrease.

In addition, the relationship between bid value and downstream Government revenues should also be considered in setting K . For example, where bids are tax deductible, if a bid is strategically decreased by the bidder, then the tax deduction is reduced also, so that the Government will gain greater tax revenues from leasing the property. Thus, K could be set somewhat lower compared to the case where bids are not tax deductible.

An example of how the reservation price could be determined is indicated below:

1. Calculate a DCF value for each sale tract.
2. Calculate rejection coal economic value (RCEV).
 - a. PV (bonus): Calculate the loss in present value of the DCF as a bonus if tract leasing were delayed until the next sale.
 - b. PV (royalty): Calculate the loss in present value of the royalty cash flow stream if its start is delayed until after the next sale.

c. RCEV: (DCF value) - Δ PV (bonus) + Δ PV (royalty)).

3. For each tract:

a. Production ranking factor (PRF): Divide fifth-year production goal (PG5) into fifth-year tract production (Pt), normalize, and multiply the normalized value by the IRF, i.e.:

$$PRF = \frac{(IRF) \left(\frac{P5}{PG5} \right)}{\left(\sum \frac{P5}{PG5} \right)}$$

b. Payroll ranking factor (PARF): Divide fifth-year tract payroll (PR5) by the current total payroll (\sum PRO) for the same geographic area included in the institutional ranking factor, normalize, and multiply the normalized value by IRF, i.e.:

$$PARF = \frac{(IRF) \left(\frac{PR5}{\sum PRO} \right)}{\left(\sum \frac{PR5}{\sum PRO} \right)}$$

c. Cash impact factor (CIF): Sum the fifth-year net dollar impact on county government, city government, and local schools for each tract, rescale, normalize, and multiply the normalized value by IRF, i.e.:

$$CIF = \frac{(IRF) (Gi + GI \min)}{\sum (Gi + GI \min)}$$

4. Calculate MAB:

Reservation price = RCEV - (PRF + PARF + CIF) RCEV

Reservation price = MAB = RCEV (1 - PRF - PARF - CIF)

Where: (1 - PRF - PARF - CIF) = K and RCREV = G so the functional formula is once again reservation price = KG.

The difficulty with this process is that the setting of the reduction factor is highly arbitrary and possibly subject to discretionary abuse. If operated properly the system would be internally consistent, but there is little basis for saying what factors should go into the reduction constant or for establishing the initial values on the uncertainty levels involved.

FAIR MARKET VALUE BRIEFING PAPER: Option 5

Question: How should the DCF be used to determine reservation prices if tract-specific rather than flat-rate reservation prices are utilized? Specifically, should the government's DCF calculations exclude quasi-rents which may appear to exist only because of temporarily-constrained Federal coal supplies within a region?

Recommended Policy: Tract-specific reservation prices should be set equal to the calculated expected present value economic rent using conservative assumptions on coal price and other DCF model inputs as described in the analysis. Specifically, a "competitive" coal price should be assumed in order to calculate properly lease rents free of quasi-rents.

Analysis: Theory suggests that a proper reservation price should be less than the estimated expected present value economic rent. We were able to identify numerous factors supporting this qualitative assessment* and several policy tools by which such an adjustment could be made. However, the degree of adjustment necessary is unknown based on existing data. The most reasonable alternative to discarding the tract-specific reservation price approach is to set such reservation prices based upon highly conservative assumptions for the calculation of lease rents, i.e., low f.o.b. price**, high production costs, and high discount rate.

A suggested approach for estimating a conservative f.o.b. price will be presented subsequently. Based on available coal production cost data, a "high production costs" standard is readily developable. A conservative discount rate would be one based on the higher rates of return commonly utilized in coal project planning which include some additional risk elements rather than on the average rate of return evidenced on completed coal-production projects or on the weighted average cost of capital to the coal industry.

The proper price to use in estimating the economic rent of Federal coal leases is the price at which the coal will be sold f.o.b. under long-term contracts to utilities (the most likely use of western coal will be in coal-fired electricity-generating power plants). Once firms obtain their Federal coal leases, they will have to compete with other lessees and existing coal owners in the region to obtain such coal production contracts. The f.o.b. price at which they will be able to sell their coal depends on the degree of competition for coal production contracts that exists after Federal coal lease sales in the region. Before

* See "Fair Market Value, Economic Rent and Federal Coal Leasing," Donald J. Bieniewicz, October 17, 1979, pp. 24-25.

** The price per ton of coal delivered "free on board" a railroad freight car.

developing a conservative approach to estimating this f.o.b. price, we will examine how this f.o.b. price is shaped by a combination of market forces and DOI coal leasing policies.

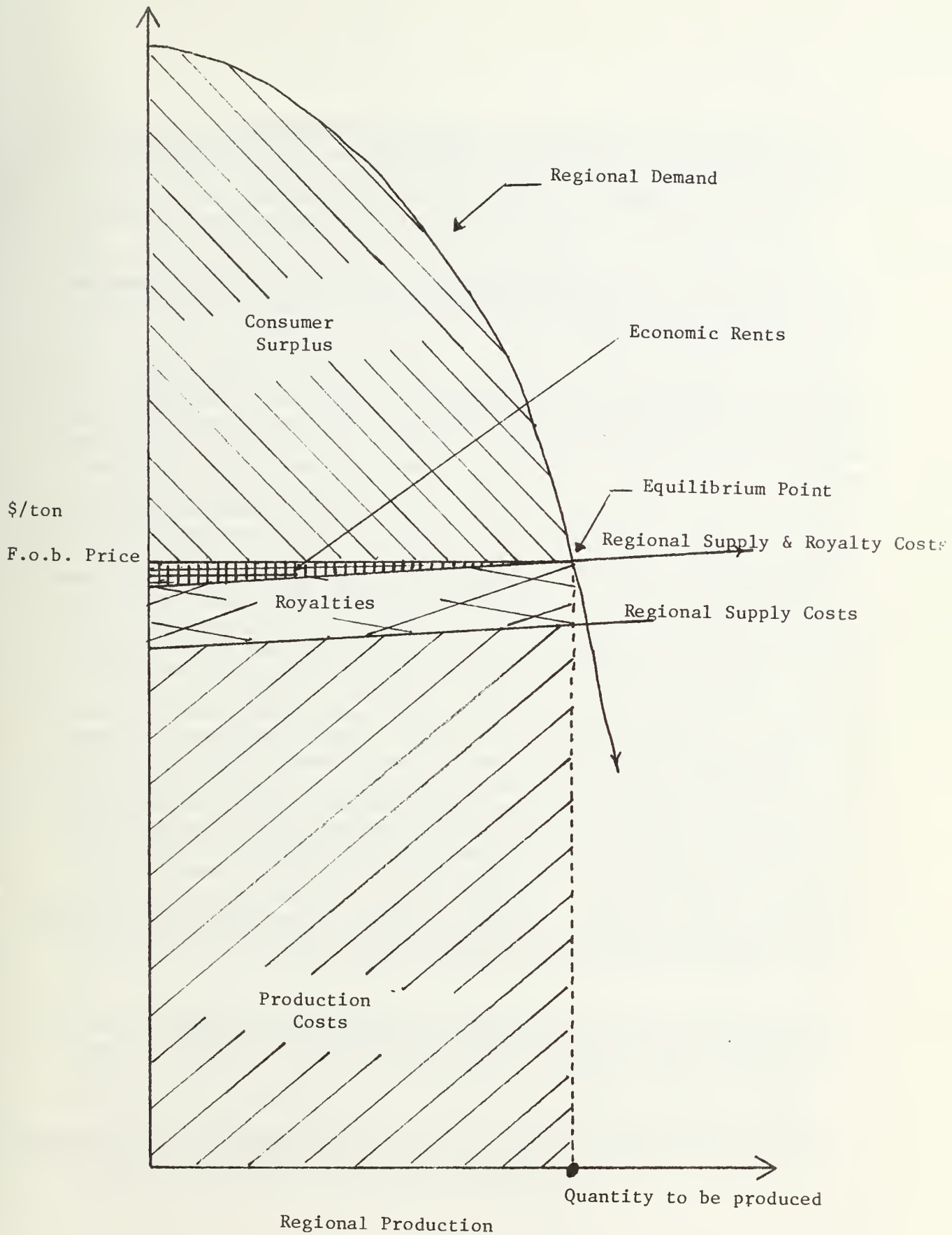
If the supply of Federal coal in a region was totally unrestricted, then a competitive equilibrium of the regional coal supply and f.o.b. coal demand would result in the selection of only the highest-quality, lowest cost coal for production, would determine the number of mines which would receive production contracts, and would set the f.o.b. price which would be paid in the region for such coal production. Because of the vast supply and similar production costs per ton of the finest coal within each western region, most of the social welfare benefits at this market-determined optimum point would be in the form of consumer surplus* rather than in the form of economic rents to producers. (See graph on following page.) At this point of competitive equilibrium, the f.o.b. price would equal the average cost per ton of coal production from the marginal mine, i.e., from the last, and highest cost mine which is able to obtain a coal production contract in the region. Thus, the producer of the marginal mine will obtain zero economic rent. But because unit production costs would not be much lower on other mines which get contracts than the unit cost at the margin, there would be minimal economic rents to all producers.

Consumers will be the big winners in that the amount of coal produced will be at the lowest possible price, assuming all tracts developed have insignificant external costs of coal extraction (those costs to society not paid by producers and thus not accounted for by the market in allocating production contracts). However, some tracts may have significant external costs or external benefits. Also, principles of multiple resource planning suggest that unlimited availability of Federal lands for coal leasing may prematurely commit, or overcommit, such lands to a single use. The policy selected by the DOI for consideration of these additional factors in Federal coal leasing is multi-faceted and includes utilization of the following policy tools:

- Strict enforcement of those laws such as the surface reclamation law which require coal producers to internalize what would otherwise be external costs of coal production.
- Diligence requirements and total acreage ownership limits to prevent idle speculation in Federal coal properties and premature single use commitment of Federal lands.

* Consumer surplus is the value difference between the amount that buyers are willing to pay, and the amount that they actually have to pay, to obtain their purchases.

Graph Depicting Equilibrium of Supply and Demand



- A Federal coal management system wherein Federal coal tracts are screened and those tracts having high potential external social costs (such as risks to endangered species) would not be made available for lease; ranking of tracts by quality so that the ordering of tracts offered would be the same as would be determined by competition in an unrestricted market; and use of regional production targets to guide the offering of tracts in sufficient number to allow the amount of coal produced to be similar to the production level which would occur in an unrestricted market.

Because of the very large amount of high-quality, low-production-cost coal whose potential development could be unlocked by Federal coal leasing, the screening out of Federal tracts having high potential external social costs from the set of tracts available for leasing is expected to have only a minimal effect on the potential supply or cost of coal in each region. Therefore, if the regional production target is set correctly or slightly too high, and quality-ranked Federal coal tracts are leased accordingly, the market results of such restricted leasing should be very similar to those of unrestricted leasing of Federal coal, but with a lower level of external social costs. In other words, a similar level of coal production should result, the f.o.b. price should be very close to the f.o.b. price in the unrestricted supply case, and economic rents on leased tracts should be very small. But if the regional production target is set too low, the number of tracts leased may not be sufficient to achieve the above desirable conditions. In this case, a lower level of coal production will tend to result, the f.o.b. price will tend to be higher, and economic rents may be significant on leased tracts. However, where signs of significant rents or inadequate post-sale competition for production contracts are evident, the identified Departmental response will be to lease coal as rapidly as possible within the checks and balances of the system* until these conditions are mitigated. Awareness by the coal-production and utility industries of this Departmental policy will tend to bring the f.o.b. price rapidly to this "competitive" level even if initial lease offerings are small in number, because the certainty that continued leasing would soon force this competitive price would allow utilities safely to refuse to pay anything higher, early on.

Another policy tool by which the government can assure that the "competitive" f.o.b. price obtains is to require in its lease terms that produced coal be sold at "reasonable" prices. Although this is

* See Statement by Charles Rech, Acting Director, OCLPC, at public hearing on fair market value, November 1, 1979, from Proceedings, p. 219.

a legally available policy tool, due caution is advised in its utilization. If possible, it would be much better to rely on a highly competitive post-sale market to determine what is a reasonable f.o.b. price or is a reasonable return on coal mining investments, than to have the government make such determinations.

The threat of direct competition in production by the utilities will also tend to keep rents low. Evidence of large rents will be apparent to utilities from their detailed reviews of potential producers' mining costs in their awarding of contracts, and in the degree of competition they observe for their contracts. In such a case, utilities will be tempted to seek to purchase leases directly from the Federal government and to produce these leases themselves in order to capture the large rents. In order to avert this, coal companies with Federal leases may be willing to sell to utilities at the "competitive" price even when competition by other firms is weak.

Thus, our examination leads us to conclude that DOI's coal leasing policies and competitive market forces will combine to move the f.o.b. price on new Federal coal leases very close to the f.o.b. price which would obtain in the case of an unrestricted supply of Federal coal in the relevant western sale region (given a 12.5 percent royalty in both cases). We shall now consider an approach to estimating this f.o.b. price conservatively for use in DCF calculations of the expected present value economic rent of Federal coal leases.

One important initial observation is that because economic rent from coal production represents a very small difference between two large numbers, f.o.b. price and cost per ton of production, independent estimation of these two factors will tend to produce a DCF output whose estimation error is of the same order of magnitude as the rent value being estimated.* Such an error-prone estimate is unlikely to be particularly useful for reservation-price purposes. A superior approach would be to key the more uncertain of the two factors, the f.o.b. price, to the cost data so that the estimation error in the DCF output will be small. The obvious place to link these two factors is at the market equilibrium point where the average cost per ton of production from the marginal mine is exactly equal to the f.o.b. price.

A second important observation is that the most expensive to mine Federal coal tract (per ton of production as part of its logical production unit) which is likely to be leased and produced in the region can be considered to be the marginal mine for the purposes of estimating the f.o.b. price. This is because it is the marginal mine which is always driven out of a market by a new entry. The

* See appendix for an example of how this can occur.

most expensive to mine Federal tract which obtains a contract will thus either become the new marginal mine or be very close to marginal; otherwise, another, slightly higher cost Federal tract would have obtained a production contract and the former tract would not have been properly defined as the highest cost Federal tract to obtain a contract.

Thus, our task becomes one of estimating which Federal coal lease is likely to be the marginal mine and then setting the f.o.b. price equal to its estimated average cost per ton of production. To identify this marginal mine will require at least a simple model of regional supply and demand. If new Federal coal leases (as part of their logical production units) are expected to be producible at a much lower cost than existing coal supplies within a region, then development of a post-sale regional supply cost curve (a graph of the production cost per ton of each additional ton of coal production from the region) is simplified. It can be assumed that all new coal production contracts will be to newly leased Federal coal tracts. Thus, the post-sale regional supply cost curve can be based on the estimated cost of production of the Federal coal tracts to be leased in the region in order of their increasing production cost per ton. Where existing coal supplies may be competitive with new Federal offerings, such existing coal supplies must be factored into the regional supply cost curve as well. However, it is most likely that the only portion of the supply cost curve needing to be estimated is that which is related to the lowest cost per ton Federal coal tracts within the region.

The tract-specific cost data necessary to develop the supply cost curve should become available from the tract-ranking step of the Federal coal leasing process. To be conservative, this supply cost curve should be estimated using low mining cost assumptions. A supply cost curve estimated in this manner should yield a conservative, low estimate of the f.o.b. price for whatever amount of coal is produced from the region.

Besides the regional supply cost curve, there must also be developed a regional demand curve which is a graph of the amount of f.o.b. coal which would be contracted from the region at any given f.o.b. price. This demand curve can be estimated in several ways. One way is to use a curve provided by ICF from their national coal model. A second method is to develop such a curve in-house via the USGS coal transportation model. A third approach is to survey the most likely potential contractors for the region's coal regarding their planned projects for which they will be contracting f.o.b coal from the region if such coal should become available. These individual demand responses as a function of f.o.b. price could then be combined to find the regional demand curve.

The intersection of the conservatively estimated regional coal supply cost curve with the estimated regional demand curve will determine the equilibrium point of supply and demand and determine a conservative estimate of the f.o.b. price for the region. Where the demand curve cannot be developed, the marginal point (and f.o.b. price) can be approximated directly based on the DOE regional production goal and the estimated regional supply cost curve. The f.o.b. price estimated in this manner would be in the proper form to use as an input to a DCF model for conservative estimation of the expected present value economic rents of Federal coal leases where such rent estimates will be utilized directly as reservation prices.

The advantages of the use of a conservative approach to DCF analysis are apparent from the above discussion. Its disadvantages are:

1. Determination of marginal-mine price will be a difficult job, and, in fact, the analytics to make this determination are as yet undeveloped. A policy of using both prices from a market survey and from cost-plus analyses during a prove-in period is suggested.
2. The Department will be subject to renewed criticism from those who equate fair market value with outright maximization of the government's receipts from coal sales.
3. The actual net benefits of this more conservative DCF approach, which will increase the tract evaluation workload, are at this time unknown.

Appendix

1. Consider the case where price p is actually 10 percent above cost c . Then:

$$p = 1.1c$$

$$\text{and rent} = p - c = 1.1c - c = .1c$$

Suppose estimates \hat{p} and \hat{c} have independent errors \hat{e}_1 and \hat{e}_2 such that \hat{e}_1 and \hat{e}_2 are normally distributed with means 0 and standard deviations $.1p$ and $.05c$, respectively.

$$\begin{aligned}\text{Then rent estimate} &= \hat{p} - \hat{c} \\ &= p + \hat{e}_1 - (c + \hat{e}_2) \\ &= p - c + (\hat{e}_1 - \hat{e}_2)\end{aligned}$$

Now because \hat{e}_1 and \hat{e}_2 are independent, the mean of $\hat{e}_1 - \hat{e}_2$ is zero but its standard deviation is

$$\sqrt{(.1p)^2 + (.05c)^2} = \sqrt{(.1(1.1c))^2 + (.05c)^2} = .121c.$$

Thus, the error term in our rent estimate has a standard deviation greater than the actual rent which is $.1c$.

2. Consider the above case but where estimates \hat{p} and \hat{c} are not independent, i.e., where the relationship between price and cost is known, but the absolute level of the price and cost is uncertain. In this case we would estimate rent using our known relationship and the factor having the smallest uncertainty which is our cost factor, as follows:

$$\begin{aligned}\text{rent estimate} &= \hat{p} - \hat{c} \\ &= 1.1\hat{c} - \hat{c} \\ &= .1\hat{c} \\ &= .1(c + \hat{e}_2) \\ &= .1c + .1\hat{e}_2\end{aligned}$$

The mean of $.1\hat{e}_2$ will be zero and its standard deviation will be $.1(.05c) = .005c$.

Thus, the standard deviation of the error term in our rent estimate will be small in relation to the actual rent which is $.1c$.

FAIR MARKET VALUE BRIEFING PAPER: Option 6

Question: Should different evaluation procedures be used for large than for small tracts?

Analysis: In Federal coal leasing, tract evaluation via discounted cash flow (DCF) methods is useful when it increases the size of the share of the economic rents captured by the government over the size of that share which would have been captured without such evaluations. It is clearly the Congressional intent that such work should only be carried out if returns to the government warrant it. The method by which DCF-based tract evaluations improve Federal rent-capture is by allowing for a more accurate, higher setting of minimum acceptable bids on tracts. Such a procedure is used because competition is expected to be weak. However, because these evaluations are not cost-free, they are socially wasteful if unnecessary or if they do not result in rent-capture increases exceeding their costs. The Congress has already determined a reasonably high level for minimum royalties on surface mined coal which is complemented by a similar level for underground coal set by the Department. Many small tracts will not, after an independent evaluation, exceed these pre-set values. Where DCF methods are not cost-effective, a flat-rate minimum acceptable bid approach would be preferable. Thus, there would seem to be a cost-effective mix of tracts for which detailed evaluations should be carried out and tracts for which they should not. This observation led the task force to its recommendation in Section 1 for use of a mix of systems. The two systems recommended are described earlier in this section—options 3 and 5. Since quantitative data were not available to the task force to carry out the study of the appropriate definition of small tracts, this study is recommended as further work.

Recommended Policy: Evaluation procedures which lead to tract-specific reservation prices should be utilized for large tracts; evaluation procedures which lead to flat-rate reservation prices should be utilized for small tracts. Small tracts are hereby defined to be those having the following characteristics, all other tracts being defined to be large tracts:

1. Any tract for which the USGS designated responsible official and the BLM authorized officer jointly determine significant economies of scale exist only if mined with adjoining non-Federal coal. (Generally, significant economies of scale exist if the total cost per ton of production from the candidate small tract operated as a single mining unit in conjunction with the adjoining, available non-Federal coal or with existing leased Federal coal were on the order of 25 percent less than the candidate tract operated as an independent mining unit made up entirely of the most efficient block of contiguous, unleased Federal coal.)

2. Any tract qualifying for lease on application, e.g., emergency leasing, under subpart 3425 of the Federal coal management regulations. In addition, any small tract qualifying for lease on application because it is outside coal production regions or because it is a special hardship lease or any tract qualifying because of loss of efficiencies of scale should not contain greater than 30 percent of the unmined reserves of the probable combined mining unit.

Final definition of what constitutes a small tract should be based on an OCLPC-supervised study concerning the feasibility and possible incremental benefits of utilizing tract-specific reservation prices instead of flat-rate reservation prices.

SECTION IV: MODIFICATIONS TO FEDERAL COAL MANAGEMENT PROCEDURES ON FAIR MARKET VALUE

In addition to considering the major viable process options available, the fair market value task force also studied more specific changes the Department might put into effect to improve its fair market value policy and procedures. These studies were suggested by the June SID recommendations. The resulting options for change are summarized in this section. The two major areas for study were changes to enhance competition and changes to resolve the small tract problems.

Enhancement of competition was the number one recommendation of the June 1979 report of the Fair Market Value Task Force to the Secretary.

Small tract evaluation procedures have been the number one cause of evaluation difficulties. These evaluations are difficult because of the basic all-or-nothing tract value question that underlies them. Within a wide range small tract values are set by bargaining ability. The small tract evaluation question is technically not answerable without making some rather arbitrary judgments about the bargaining strength of the would-be lessee and the willingness of the Department to see some coal bypassed.

Other specific changes discussed in this section concern the release of information, selection of discount rates, and study of a profit-sharing system. Recommendations resulting from these considerations are presented in Section I; the option descriptions provided in this section should give further guidance on the intent of these task force recommendations.

Question: What changes can the Department of the Interior make to foster greater competition for Federal coal leases?

Background: Key to all Fair Market Value strategies is the need for the Department to take steps to enhance bidding competition at coal lease sales. This was the primary recommendation of the FMV task force in the June 1979, Secretarial Issue Document. Because of comments received from the public and the views of the outside expert panel on fair market value, it has grown even more important in the minds of the task force since. The following possible actions to enhance competition apply to all the procedural alternatives.

One possible means for enhancing competition is the use of intertract sales. The FMV task force believes significant conceptual advances have been made towards a workable intertract sale system (progress due in large part to the participation of the intertract bidding task force chairman on the FMV task force). The intertract bidding process is presented in Section V. Because it is still the subject of another task force, no recommendation is made here.

Dr. James B. Ramsey, a member of the expert panel, strongly believed that, if high economic rents were truly available, the market would find a way to provide the competition necessary for active auctions that would result in the government's receiving the rent involved in the sale, but he also urged the Department to be more aggressive in seeking methods of increasing sale bidding competition. He urged the Department to look closely for ways, both through policy and legislative changes, to remove barriers to participation from those persons whose interest in Federal leases was based on assembling land for later assignment to coal companies rather than on immediate production. Enhanced competition, both actual and perceived, would result if such a secondary market were present. The task force recognizes that the past decade of confusion and change was ignited by the perception by the Congress and the Department that there was too much idle speculation in Federal coal properties. The task force believes it is possible to strike a balance in policy between encouraging an active secondary market in coal properties to foster greater bidding competition while avoiding very long-term holdings of Federal coal leases without active development at very low costs.

Possible means of fostering competition are set out below:

1. Pre-sale Unitization. Nearly everyone's first choice for a method to improve competition is the use of unitization prior to sale of private, State, and Federal coal into a single efficient property for coal production. Divided private-Federal ownership often gives an advantage to the coal developer that has control of the private lands because only he can be certain of having enough reserves for

an efficient sized mining unit. Pre-sale unitization could avoid Federal sales that have the appearance that one bidder is in a favored position due to his other holdings, thereby discouraging more bidders from competing for the tract. In the recently completed Green River-Hams Fork delineation 9 of the 15 tract study areas (preliminary logical mining units) included significant private lands.

Despite the fact that the unitization concept appears to be highly desirable to most persons who have thought about Federal coal leasing, the Department has not been very successful at getting a unitization effort going. Part of the difficulty lies in the uncertain authority of the Secretary. The Congress appeared to some to repeal the authority of the Secretary to foster "collective contracts" for development or operation of the coal resource in drafting the Federal Coal Leasing Amendments Act of 1976. The following language is from the House report on that bill:

"Section 5 repeals, subject to valid existing rights, subsections 2(c) and 2(d) of the Act of August 31, 1964 (30 U.S.C. 201-1). These subsections permitted lessees of a coalfield to enter into contracts for collective prospecting, development or operation of the coal resources. They also enabled the Secretary to combine, alter, or revoke leases, royalty agreements and the like in furtherance of collective contracts.

"This new language eliminates collective contracts in favor of the concept of the logical mining unit (LMU). A logical mining unit is a contiguous tract of land, under the control of a single operator, which is designed to promote the 'efficient, economical and orderly' recovery of the resources contained therein. The new language enables the consolidation by the Secretary of several tracts (be they Federal, State or private) into a single tract not exceeding 25,000 acres so that they may be mined in the most economically efficient manner. All the reserves within the entire LMU must be mined in a period not to exceed forty years, and the unit as a whole is subject to the requirements of diligent development and continuous operation. The new language also permits the Secretary to require a lessee (emphasis added) to form an LMU."

The effect of the changes in the coal leasing laws are unclear. What is clear is that the Secretary's authority was clouded by the change. Discussions with members of the Department who were involved in the final stages of drafting and reviewing FCLAA, however,

have led the task force to conclude that the Congress did not mean to diminish any power the Secretary already had to foster unitization of Federal and non-Federal coal tracts.

Thus, for example, it appears possible that the Department could adopt as policy the position that it might decline to conclude leases of Federal coal where a contract on unitization of Federal and non-Federal coal does not exist between a high-bidder for Federal coal and the private owner. This would be very similar to the policy the Department has adopted for ensuring competition on tracts involving surface owner consents. There the Department declines to lease lands without transferable consents. To initiate such a procedure, the Department could notify the owners of adjoining private coal that it is considering proceeding with the leasing of Federal coal that could most efficiently be mined with their property (i.e., greater benefits to both parties) and ask them for an indication if at that time they were willing to consider entering their property into a unitization agreement with the eventual winner of the Federal lease. Either the lessee or the non-Federal property owner or his assignee could be the operator of the unitized mining unit. If the Government received an indication the private owner was willing to consider unitization proposals from the eventual Federal high-bidder, the Department would proceed through lease sale in the normal fashion. Otherwise, it might drop the tract from future sale schedules for a fixed time, say 10 years. The sale notice for tracts to be unitized would include an announcement that the eventual high-bidder on the lease would be required to negotiate a unitization agreement with the adjoining owner and that the Department would consider the return of bonus if after good faith negotiations by the identified Federal high bidder, a unitization agreement were not concluded with the adjoining private owner. The lease would not be signed until the high bidder and the adjoining Federal owner had concluded their negotiations.

This is but one of several possible approaches to overcoming ownership barriers to competition--aggressively seeking voluntary unitization. It is the judgment of the task force that unitization will not be transformed from the conceptual stage to a workable tool until the Department actually attempts to carry it out in the field, and this assessment is reflected in the recommendation.

2. Avoidance of Large Front-end Payments. Large front-end payments (bonuses) discourage coal land brokers, one possible source of competition at coal lease sales. While the Department should not encourage idle speculators to acquire coal and hold land at very low cost by extremely low front end costs, it might still take

steps to encourage persons willing to enter the market to acquire Federal lands in order to repackage them and resell them to coal operators. It could do this by keeping the front end cost within reach of the small entrepreneurial firm. Just the knowledge that such entrepreneurs were present in the market would foster a higher level of competition at Federal sales. The FMV task force report on June 1 set the Department on a policy of capturing tract rents mainly through bonuses rather than royalty payments. This recommendation, which increases front end costs, still holds. The task force does consider that it would be beneficial to use the deferred bonus policy to reduce payments at the sale and in the initial years of the lease.

3. Diligence. Another major factor discouraging brokering of coal leases is the 10 year diligent development requirement. The FMV task force was urged by some to seek legislative change to this requirement, but rejects the notion because of the many key roles the presence of diligence requirements plays in the Department's overall Federal coal management policy. At the same time the task force urges the Department to guard against attempts to make diligence requirements more stringent through regulations.
4. Sales Methods. Possible changes to sales methods could improve competition. A task force paper by C. E. Brownell, "Recommended Sale Procedures" suggests one type of change that might be made. That paper considers means to leave some tracts that do not receive minimum bids "on the block" for an extended time (up to 6 months) to allow land brokers and coal companies the chance to compete for them after the result of other tract bids become known. The task force suggests that all sales be conducted in two stages of sealed bids followed by oral auction. The task force recognizes the expertise of the BLM in this area and defers to that agency for other means to increase competition through appropriate sales methods. The task force notes in passing that BLM in the past has used sales methods to block "nuisance" bids; this practice should be reviewed.
5. Information Availability. Easier access to information on coal characteristics should increase coal competition especially from smaller firms. High information costs and withholding of information act as barriers to potential coal lessees. Information policy considerations relating to fair market value are treated later in this section.
6. Access. The Bureau of Land Management has studied the benefits that might be expected from guaranteed access. The conclusions from that study should be available shortly.

Recommendations (also in Section I):

1. The task force recommends that the Department identify several means to attain unitization (a final report on this topic should be available from the Office of Policy Analysis shortly) and try out the most promising on one of the later scheduled tracts in the sales in Green River-Hams Fork. A tract should be selected that is conducive to unitization, for which clear benefits are to be had by both parties, and for which success appears most likely.
2. The task force recommends that the Director, BLM, examine implementing a system whereby all sales involving bonuses are on a deferred bonus basis and the sum of the first three bonus payments due the government would never be greater than, say, \$500,000 nor less than \$25,000. The BLM should also decide whether to extend the number of deferred payments above five. An exemption from this rule for very small tracts would also be needed. This recommendation would be consistent with the Congressional preference for deferred bonuses.
3. BLM should design and implement sales methods that will foster greater competition for Federal coal leases. Specifically, BLM might consider continuing sales; opening oral bidding to anyone that bids on any tract in the sale; or using oral bidding whenever the second-high sealed bidder is within 50 percent of the bid of the high sealed bidder.

Question: Should the in-house Geological Survey discounted cash flow model or successors be released to the public?

Background: The currently used DCF model for making coal resource economic evaluations was developed and documented internally with support from GSA computer specialists. Its design follows accepted cash flow principles and has been described in the technical literature. ^{1/} The issue of release of the model (i.e., the documentation) was discussed in memorandum of August 16, 1977, prepared by Assistant Division Chief, Resource Evaluation, Conservation Division, USGS. ^{2/} This statement needs review in view of the decision in the "Pitman" ^{3/} case regarding release of the model and data on a coal tract and the Department's new management philosophy on Federal coal.

Analysis: There is a need for the public to understand the economic evaluation procedures. However, it would seem this requirement is met in the technical paper which was published.

Given that the Pitman case does not require disclosure, potential disclosure could encourage potential bidders to concentrate their efforts toward predicting the Geological Survey's estimates rather than formulating their own independent estimate of the value of the lease, particularly where very low levels of competition are anticipated and, hence, where independent judgment of value is most important. In more inherently competitive situations, competition could be inhibited because potential bidders who determined that Geological Survey values for a tract were likely to be much higher than their own estimates would be discouraged from bidding on the tract. Moreover, the potential for collusion among bidders is increased with any increase in the measure of predictability of Geological Survey values.

Disclosure of full details of the methodology would provide a target of opportunity for high bidders with rejected offerings, subjecting the Department of the Interior to more lengthy, costly, and highly technical legal proceedings requiring judgment on technical matters which are difficult to assess in the courts.

Recommended Policy or Options: The generalized approach is already released (Ref. 1). Do not release model, but release major assumptions in the model upon request, for example, discount rate contingency costs, etc., that have been approved by the Department.

References:

1. Pederson, J.A., Blair, T.J., Connors, F.W., and Smith, M.T., 1979, Coal resource economic evaluation, in SPE-AIME Eighth Hydrocarbon Economics and Evaluation Symposium, Dallas, Texas, February 11-13, 1979, Proceedings: Society of Petroleum Engineers Paper APE 7718, p. 62-69.

2. Memorandum August 16, 1977, To: Director, Geological Survey, From: Assistant Division Chief, Resource Evaluation, Subject: "Rationale for not Disclosing Detailed Descriptions of Computer Models Used in Resource Economic Evaluations"
3. Frank Pitman vs. Department of the Interior, Civil Action No. 76-F-1022, Judgment August 24, 1977.

Question: What categories of data should be provided prior to sale to the public and potential bidders prior to sale for their use in preparation of bids for coal leases?

Background: The Federal Coal Leasing Amendments Act of 1976 provides that quantity and quality data on coal resources, associated formations, environmental factors, along with an assessment of mining methods, including maximum economic recovery determinations of reserve, be made available to the public. These statutes indicate that these data can be obtained through government financed or through industry data gathering programs such as test drilling.

The question of what categories of data to be made available to the public and potential bidders subdivides into two issues:

1. Providing adequate coal resource and associated overburden, underburden, and interburden, hydrologic and related physical factors, plus basic elements of mining methods and equipment and facilities so that the public can assess the value of the coal resource, and potential lessees can devise an adequate plan for development including costs and revenues and to prepare a bid on the tract of interest.
2. Provide all resource, mine design, cost, and revenue factors along with the minimum acceptable bid for the tracts offered in a lease sale.

In most cases appraisal values are made public or at least available to the potential buyers (or sellers) prior to the start of a sale or negotiation. Making the minimum acceptable bid known to potential bidders in some fashion advises them of at least the minimum expectations of the government and saves them the time and cost of preparing bids which have no chance of success. It leaves them free to consider the competition from other potential bidders, and they will not have to outguess the seller as well.

Analyses: Release of data on the physical description of the tract is designed to provide the serious potential bidder with the data on coal resource and associated environment along with informing the public. From their data the firm could design an optimum mine, select equipment and necessary facilities, and specify the costs and revenue elements applicable to the firm, and thereby develop a basis for bidding on the tracts in which it has an interest. This approach seems most applicable to leases that would require the development of new mines and associated facilities and tend to have a competitive interest.

Release of all data, including economic-based data, provides an estimate of all levels of input data and final results of coal resource, mine design and costing through to, and including, tract value. The costs

and revenue parameters must be obtained from varied sources. In addition, in times of double digit inflation the changes in base level of the monetary factors changes significantly in a short time so that the useful life of the cost data is limited. In this approach a potential bidder can enter the scene at any level of data development. However, if the bidder does not start with an assessment of the raw resource data, he will not have a complete understanding of the strength, and applicability, of the available information. If these data are used by a firm, the Government must be careful not to be made liable for effects on operations that are incurred because of reliance on the Government provided data. This practice may lead to collusion because all firms would have a value to zero in on and accordingly may desire to minimize the difference between Government values and their bids. This approach seems more applicable to small tracts where the offset operator and/or applicant has extensive knowledge of the coal resource, its feasibility of mining and probable mining operation.

Therefore, he knows the basic factors and is probably most interested in obtaining the best personal bargaining position. Greater knowledge of the Government assessment of the value of the coal resource would tend to enhance the interested firm's ability to acquire the tract at lesser cost.

Recommended Policy or Options: The FMV task force recommends that the policy be to release comprehensive coal resource information (including preliminary estimates of MER reserve amounts), overburden, interburden, and underburden, other resource data, as well as equipment selection, generalized mine plant design, and facilities information. A preliminary minimum acceptable bid should be published, as is done under the present procedures, and the Department should ask for comment on this estimate.

References:

1. Pederson, John A., "Public Disclosure of Resource, Recovery, and Economic Data on Coal Tracts Prior to Lease Sale." Report, November 1979, U.S. Geological Survey, prepared for Office of Coal Leasing, Planning and Coordination.

Question: Should the Department examine the possible use of a profit-sharing system for Federal coal leases?

Background: Comments from both industry and Indian tribe representatives have strongly challenged the government's concept of the amount of rents that are available to the government in Federal coal lease sales. Industry asserts that there are little or no resource rents, especially after a cost allowance for developmental risks. Indian representatives on the other hand argue that even with the existing FMV system, the government's estimates of rent are biased downward, i.e., we are already backed considerably away from full rent capture. The intensity of feelings on both sides is such that the Department is unlikely to be able to get either group to move from their positions.

There is a payment system, however, that would allow the government to collect "rents" without trying to determine them prior to sale and thus circumvents rent arguments and a great deal of administrative complexity. It also allows the government and industry to share the risk of non-development. This system is the so-called profit-sharing system. The system might more accurately be called an excess-profit sharing system since normal profits are not shared. Use of such a system by the Department could only be implemented with the full agreement of the Department of Energy. With an all-out effort a profit-sharing system might be ready by 1982.

Analysis: There are several methods of profit sharing. Worldwide profit sharing has become the standard form of agreement between a resource-owning governmental entity and a private-sector resource developer. One example of a profit-sharing system is the annuity-capital recovery system. This system comes close to identifying the true economic rent for division between the government and the lessee. Under this system the total capital outlays (equity investment) of the project are converted to an annual annuity that is subtracted from profits. Thus the private investor is ensured return on his capital. Loss carry forward is included in many profit sharing systems. The profit-sharing system is administratively awkward. Usually, a simplified accounting system is used that involves only direct, easily verifiable costs. The government would probably lease tracts in profit-sharing sales with a mandatory stipulation that bookkeeping be on the basis of an entire mine project to avoid the complexity of keeping books on every lease involved in the project. The Department must agree with the lessee on a formula for assigning what portion of the project's profits would be assigned to the lease, etc., which could be difficult (cf., small tracts paper on disaggregation).

There are several bid variables that can be used in a profit-sharing payment system, for example:

1. The bidders might bid the share of profit they will pay the government (fixed share) with government royalty and bonus fixed;
2. The government might select a profit sharing split and the bidders bid a bonus payment; or
3. The government might select a profit sharing split, together with a minimum bonus and royalty, and the bidder bids the starting level for the profit measurement.

This last option could be made clearer, perhaps, with an example. Suppose the government decides to require payment of 50 percent of all taxable income less an annualized return to investor's capital. The bidder would bid what he believed was an acceptable annualized return to capital to him, thus relieving the government of the need to compute (or audit) what the "fair" return to capital was on the lease portion of the project. The government would receive a low bonus, minimum required royalty, and 50 percent, say, of all net income greater than the bid amount. (Note: the FMV task force believes that the fixing of the Government's share of profit is likely to be based on broad policy considerations.) Rather than a straight profit split, it is also possible to use a profit share schedule with the government's share increasing the higher the level of excess profits. This sliding-scale approach is more consistent with capture of very large rents by the government than a straight profit split. Thus, under the third bidding system above with the annualized annuity the bid amount, the government might split profits 50-50 up to twice the annualized rate of return, take 60 percent up to three times the bid rate, and 75 percent over that. With a bonus bid system, the rate schedule could be determined off of a DCF evaluation, again topping at 75 percent at some proportion of the DCF evaluation.

This sub-option is compatible with all the major procedural options.

Recommendation: The FMV task force recommends that the BLM and GS form an implementation group with direct DOE participation to devise a profit-sharing system that could be implementable by early 1982. LCC is assigned management oversight for this group. It is assumed that this system will be implemented for the Powder River sale unless the Director, USGS, the Director, BLM, or the Department of Energy decide upon review of the implementation group's proposal to veto such implementation by memorandum to the Secretary of the Interior. In the case of BLM and USGS this veto would be expected to only be on grounds of administrative and other direct regulatory costs.

Reference:

1. "Analyzing Profit-Share Leasing," prepared for the Office of Policy Analysis by Resource Planning Associates, Inc., August 7, 1979.

* See S.L. McDonald, "The Leasing of Federal Lands for Fossil Fuels Production," RFF, 1979, pp. 102-105

QUESTION: HOW CAN THE DEPARTMENT IMPROVE ITS EVALUATION OF SMALL TRACTS?

Because of the task force's major recommendation, these technical changes are of reduced importance; however, they will still apply in certain situations such as large, mixed ownership tracts, exchanges, and, possibly, lease modification.

A. Question: Should the current practice be continued of aggregating lands, regardless of ownership, for the purpose of computing a coal economic valuation or should the evaluation be based on available Federal coal lands only?

Background: Economies of scale can in fact be gained by the combination of small tracts of coal resources into larger more viable economic mining unit (VEMU). Often the larger unit is the only way of mining any of the coal economically; sometimes, however, smaller tracts could be mined independently using higher unit cost methods. Standard practice has been to combine all available lands to determine value.

Analysis: Evaluating a small tract in isolation would probably result in a low or zero value finding and not be representative of the methods and costs related to how the coal would most likely be mined in reality. Evaluating a small tract within a larger VEMU would result in a larger value, but can be open to criticism of capturing value from non-Federal coal or value created by the ingenuity of the private operator. However, the latter criticism is one of distribution of value among the component tracts and not a question of value computation (this issue has been legally resolved for oil and gas deposits, see reference 1 and briefing paper on "disaggregation of value"). Expert consultants to the task force recommended a "value in use" approach over a "market value" approach for small tracts because of the captive nature of the tract, i.e., there is no presumption of effective competition among bidders. This approach violates appraisal concepts.

Recommended Policy: Form a viable economic mining unit in defining the DCF land base which does estimate the highest value in use of the available Federal and non-Federal unmined coal and then disaggregate the Federal value as suggested in part B, following. In cases where a lease applicant is involved, "available" would include the applicant's land.

Reference:

1. Pederson, John A.; "Procedures for Evaluating Small Tracts;" Task Force background paper, October 1979.

B. Question: How should the computed coal economic value be apportioned among various ownership in cases where one or more Federal tracts have been combined with non-Federal tracts to form a viable economic mining unit (VEMU)?

Background: The current practice is to apportion the value only in proportion to recoverable coal resources. This method, however, ignores the possible differences in mining costs, coal quality, and the time period in the mine-life cycle when the tract may be mined. (Because of the discounting process, coal mined early in the cycle is more valuable than coal mined later, cet. par.)

Analysis: The current practice is good as far as it goes, but it could fail to account for some significant elements affecting tract value. Certain tract related mining costs, such as haul length differentials, could be easily estimated and incorporated in the disaggregation process. Also the timing of tract production could be incorporated in each run though estimating time of removal may be difficult. Coal quality differences cannot be handled within the model or the disaggregation process; this is not expected to be a significant problem in any given VEMU; where it is, some adjustment could be made in the price used to compute the CREV.

Recommended Policy:

1. Retain the current practice of disaggregating the DCF evaluation in proportion to recoverable coal reserves as the basic methodology with the addition of certain tract related mining and administrative costs when significant differences are expected to exist across the mining unit. (See No. 2 below.) Consideration should be given to the inherent greater uncertainty of small tracts.
2. For small tracts which are known, or reasonably assumed, to go into production toward the beginning or toward the end of the VEMU time cycle or for small tracts where a few key cost items are significantly different than other tracts in the VEMU, an analysis "with and without" the proposed tract should be made to estimate the proper adjustment factor.

References:

1. Pederson, John A.; "Procedures for Evaluating Small Tracts," Task Force Background Paper, October 1979.

C. Question: Should the Department seek enhanced industry participation in pre-sale minimum acceptable bid determinations?

Background: Though there is disagreement between the task force and the expert panel on the number of sales in which there will be only one or two bidders (see bid averaging paper in Section III), there is agreement that the Department will face enough of these low-bidder cases that it should not adopt a policy of outright rejecting bids and withholding tracts from sale because of lack of bidders. Though the Federal coal management program is operating in a greatly changed environment, it should be noted that between 1965 and 1975 the Department received 1.89 bids per coal lease offering on average. One possibility for managing low bidder sales, which will be most prevalent on small tracts, would be to use an enhanced procedure of pre-sale participation from potential lease bidders.

The coal management regulations presently only require that the authorized officer solicit public comment on fair market value of tracts not less than 30 days prior to the publication of sale. These comments are only on factors that might affect the appraisal of the tract or tracts. Subsequently, in the sale notice the authorized officer announces the preliminary minimum acceptable bid (MAB) to be considered. Though it is not necessarily the case, the task force has assumed that the MAB will be equal to or less than fair market value pre-sale estimates. Bidders are not given an opportunity to comment on the preliminary minimum acceptable bid. For low-interest sales, then, the Department could, in order to enhance use of industry concepts of value, offer an opportunity for comment on the preliminary determination of MAB by the Department. In essence, the Department should then have "bid" and "asked" prices before it determined the actual sale MAB. The possible use of a third party, outside appraiser for FMV in low interest sales or of a three-person committee of outside appraisers—one named by the Department, one named by a coal trade association, who then select their third member have also been suggested. All parties to the sale would then know the FMV of the tract as viewed by an independent appraisal effort and could proceed to sale with a much greater confidence of a successful transaction.

Analysis: There are disadvantages to either of these options. First, both require greater commitment of Department resources--in the first instance to carry out further evaluation run, as needed, after comments are received and in the second to support the independent analysis. Neither option is guaranteed of producing the desired result--reaching a mutually satisfactory understanding pre-sale for the minimum acceptable bid. It should be noted also that of the 20 small tract sales held in 1978 and 1979 only two failed. In part this is because of the use of high royalties, but these results cannot be dismissed entirely on that basis. (See also earlier paper on release of information.)

Recommendation: The recommendation made under what data should be released included release of preliminary minimum acceptable bid for comment. No additional action is recommended.

D. Question: What cost and price vintage should be used in evaluating small tracts?

Background: While clearly cost and price vintages should be from the same time in small tract evaluations, the Department still must decide whether to use prices and costs representative of prices at the time long-term contracts of the applicant or most likely bidder were signed or to use those in effect at the time of the evaluation. The latter rule is applied to larger tracts.

Analysis: Differences in cost and price relative levels over time cause different evaluations of small tracts. Until recently, coal values have increased over time because coal prices grew relatively faster than mining costs. If the Department were to follow its standard policy on vintages, hardship and emergency lease applicants may be faced with minimum acceptable bids they cannot afford under the terms of their existing contracts. The decision by the Department to end high royalties will greatly increase the possibility of a lease applicant being caught in a low-contract/high-minimum bid squeeze since royalties can often be passed on under the terms of contracts while bonuses cannot (see Appendix 13 of ICF report to the task force). The operator applicant would be faced with the dilemma of not bidding on the sale he had applied for or taking a certain loss. On the other side, if cost and price vintages are rolled back to old-contract terms, the Department will be seen as favoring one sale bidder over others in what is supposed to be a competitive sale structure and subsidizing the consumers of one company's coal compared to other users of Federal coal.

Recommendation: The task force believes that emergency and hardship lessees have been identified as a group deserving special treatment and that the Department should, where old contracts are known to exist, consider, on the merits of the case, using the older coal prices and deflated mine costs in the evaluation. Otherwise, present day prices and costs should be used.

Question: Should the current fixed discount rates used in the discounted cash flow (DCF) model be changed?

Background: A DCF model can be set for any discount rate. Currently CREV uses a discount rate based on guidance in OMB Circular A-94 (March 1972) and two alternative rates (+ 2 percent from that base). The base rate is considered to be risk-free, inflation-free and after tax. The OMB discount rate was "before tax" since it was intended mainly for use on evaluating government projects. Some have argued discount rate should not remain fixed over long periods of time because of changing economic circumstances which spill over into models run on an "inflation free" basis; others have criticized the resulting coal resource economic valuations (CREV) as being too high an estimate of minimum acceptable bid (implying the discount rate is too low). Generally, the task force has endorsed a conservative approach to setting discount rate.

Analysis: Expert opinion, as reflected in publications and public meetings, is not unanimous on what the discount rate should be or even if the rate can be determined unequivocally. There is a consensus, however, that the method of determining the rate should approximate that used by private industry, i.e., compute a weighted average rate of return between the equity and debt portions of the required capital. This rate will, then, change over time, reflecting basic economic shifts in the United States. The DCF model uses current coal prices and current requisition costs for new mining equipment; these assumptions do not imply any debt/equity ratio and, therefore, the discount rate shall have to be computed from industry averages. (Generally, the task force believes the evaluation by DCF techniques would be improved by inclusion of financial and inflation factors directly in the model (see ICF, Inc., letter reports to task force.) Such a rate would be neither risk-free nor inflation-free, it would contain equity returns for average industry risks and debt costs inclusive of long-term inflation effects. Inflation could be adjusted for by means of a financial market index.

Recommended Policy: The following general formula for computing the discount rate assumes the use of summarized accounting data readily available (see Ref. 2 below); an alternative data source may result from a study underway by ICF Inc., in which case the formula may be adjusted slightly.

Recommended General Formula:

$$R = (E) (r_1) (t) + (D) (r_2) (1-t)$$

where

R = computed discount rate

E = Percent equity

D = Percent debt

r1 = before tax rate of return to equity over long term

r2 = 30 year AA corporate bond rate

t = tax rate used in DCF model

It is further recommended that "R" be computed at three levels: medium, low range, and high range corresponding to levels of debt-equity ratios and ratios of return to equity. These data are available from reference 2 at quartile levels for the sample.

Action/Implementation: Geological Survey should test this procedural approach and similar alternatives using formulas of the same general form to institute a procedure that reflects industry discount rates which change over time. The equity rate used should reflect pre-project uncertainties.

References:

1. Dickerman, Alan R.; "Fair Market Value and the Choice of a Cash Flow Discount Rate;" Task Force Background Paper, October 1979.
2. Robert Morris Associates; "Annual Statement Studies;" Philadelphia, 1978 and annually.

SECTION V. STUDY PAPERS

The following are the study papers written by various individual members of the fair market value task force in preparing to make the recommendations set out in the previous sections. The first paper in this section is a reprint of the summary paper on fair market value prepared for the Secretarial Issue Document on the Federal coal management program in June 1979. Two other documents prepared by the Department on fair market value and considered in formulating these recommendations are:

"Tract Evaluation," Task #155 Issue Paper, Department of the Interior, GS-BLM Task Force, May 1978.

"Fair Market Value of Federal Coal: Concepts and Procedures," Fair Market Value Task Force, April 1979.

SUMMARY AND RECOMMENDATION OF DRAFT
FAIR MARKET VALUE TASK FORCE REPORT

Fair market value is an appraisal term. In Federal coal leasing it refers to the appraised market price of the unmined coal offered for lease, and represents the lower bound on the payment the government can legally accept for a coal property.

Economic rent, sometimes referred to as excess producer rent, producer surplus, or surplus profits, is a term that comes from classical economic theory. In coal property evaluation it refers to the present value difference between the market price of the mined coal and the costs, including opportunity cost, of producing the coal. The opportunity cost is the lost return on the next best (marginal) investment that would have been obtained had the producer invested his capital resources elsewhere.

Because of market imperfections, the expected economic rent from coal production will always exceed the market price of the unmined coal. Only under conditions of perfect competition with no transaction costs, with numerous risk-neutral bidders having equal and perfect information and homogeneity (no cost efficiencies due to scale) and divisibility of the resource, would the rent and the FMV coincide. The economic rent is the maximum amount the government could expect to receive for a coal property.

While the statutory requirement for receipt of fair market value (FMV) for Federal coal offered for lease was not established until the passage of the Federal Coal Leasing Amendment Act of 1976, the Department prior to 1976 used a variety of methods to judge the acceptability of bonus bids at competitive sales. Originally, the adequacy of bids was determined by the area mining supervisor of the U.S. Geological Survey (GS). In 1971, a standard method of evaluation was adopted by the GS, generally known as the "K-factor" method. This technique used a simple straightforward formula to estimate minimum acceptable bonuses, and was sensitive to the thickness of the coal, its depth, its heat content, and its coking qualities.

In 1976 the GS adopted the two evaluation methods which are currently in use to estimate the present value of lease tracts. The first method, discounted cash flow analysis (DCF), involves estimating the future periodic revenues from selling mined coal, subtracting the investment and operating costs, taxes and other items, and discounting the results to reflect that the dollars earned in the future are worth less than the same amount of dollars in hand today.

The second method is the use of comparable sales analysis. This method involves researching recent market transactions of similar properties, verifying the terms of discovered transactions, and correlating these values in light of differences between the market transactions and the Federal lease tract.

Based on the results of the discounted cash flow and market data analyses, the GS then makes a recommendation to the Bureau of Land Management (BLM) regarding the minimum acceptable bids. The GS recommendation is treated by BLM as the estimate of FMV although it is an estimate of the rent and not necessarily the FMV. A high bid received at a competitive auction is accepted if equal to or higher than the GS estimate of rent, or rejected if lower.

The preferred method for estimating FMV is in fact the market data (comparable sales approach), although accepted Departmental FMV appraisal standards direct that all appropriate evaluation methods be used to come to a final estimate of FMV.

Recent evaluations by the GS have almost exclusively relied on the discounted cash flow approach, because comparable market transaction data were thought to be unavailable. The question of the availability and usefulness of these data has been somewhat controversial. The FMV task force investigated the availability and usefulness of market data, and found that while regional variations exist, market data can be discovered and verified. There is still a remaining question of correlating market data to individual Federal lease tracts which can only be answered on a case-by-case basis.

A broader consideration regarding usefulness of market data remains. The Federal government because it directly controls over 60 percent of coal lands in the western States, and because it indirectly controls another 15 to 20 percent of coal lands due to checkerboard and scattered ownership patterns, could become the price leader in the market for western coal. This leadership position would mean that prices paid in comparable coal lands transactions could be somewhat influenced by prices actually received for new Federal competitive coal leases. Therefore, reliance on the market data approach to FMV would in the long run reflect our own independently formulated pricing policies.

The potential drawbacks in applying the market data approach precludes the Department from relying solely on that approach. The DCF approach to value must therefore continue to play a major role in the Department's efforts to determine FMV. The DCF approach to value, however, is also subject to several weaknesses. The DCF estimate is an estimate of the rent; thus, it can result in an estimate that greatly overstates the selling price for a coal lease. It relies on uncertain assumptions of future costs and prices. It further relies on assumptions of when production will actually commence and that production can be maintained at existing levels.

If the Federal Government can develop a more perfectly competitive market than the private comparable sales market, then the high bid received for a coal lease in the Federal market would represent the best measure of its FMV available.

The value of Federal coal under private land of surface owners qualified under the Surface Mining Control and Reclamation Act is a function of the amounts that successful lessees would pay for consent. The Department desires to ensure a fair return to the public for its coal and to maintain competition. This would be done by allowing in the calculation of minimum acceptable bids only for the FMV of surface estate damages and costs. Appraisal of FMV of damages and costs of surface may be difficult when market data shows payments to surface owners based on royalties from Federal coal. The FMV task force addressed several alternatives for dealing with this problem in both the income and market data approaches to FMV of the coal.

Small Tracts

Several problems in determining FMV have been discussed. One geographic situation often encountered when determining FMV sometimes results in the exacerbation of most of the other problems. This situation is that of leasing small tracts.

A small tract is defined for the purposes of this report as a parcel of coal which by itself probably would not support an independent mining operation, or a parcel which could be developed more efficiently (at a lower cost per ton) as part of a larger unit. Tracts of this nature have been offered for lease under the NRDC v. Hughes order, and under earlier versions of the short-term criteria. They will likely continue to be offered under both the long term and emergency leasing components of the Federal coal management program.

The Department's recent competitive small tract leasing has had varying success. Since the establishment of the initial version of the short term criteria in 1973, sixteen small tracts have been offered for competitive lease. These small tract offerings did not attract much competitive bidding (i.e., two or more bidders) because one bidder generally had a highly superior position relative to other potential bidders. This position arose from the superior bidder's ownership of adjoining coal (often including an existing mining operation), control of access, or control or ownership of the surface overlying the coal.

This lack of competition means there is little reliable market data on which to judge the reasonableness of the government's FMV estimates. It is difficult to judge whether the estimated FMV is too high or low for any given tract. If the one bidder meets the minimum acceptable bid there is no way of knowing whether he would have bid higher if he had been expecting competition or if he passed through the bid amount to the coal consumer. If the one bidder does not meet the minimum acceptable bid, it may have been due to considerations by the bidder of which the estimators

of FMV knew nothing or the bidder may have had ulterior motives which the Government should not have considered anyway. In the case of a single bidder on small tracts, the Department must simply make its best estimate of FMV and presume it is correct. However, a balancing of rent capture (as long as FMV capture is assured) against other leasing goals, such as resource conservation, is possible.

Unfortunately, the problems encountered in estimating FMV for small tracts are substantial. Comparable sales information can vary considerably. An operator who does not absolutely need a particular private tract may know that the owner must sell to him or no one and therefore will offer little for the tract. If an operator must have a small tract he may be willing to pay an exorbitant price to protect his investment in the rest of the mining unit. The results of a comparable sales analysis might vary substantially depending on which of the two situations had been prevalent during the time period studied.

Use of the DCF approach to value also is more difficult to apply for small tracts. The tract, in and of itself, may have no value according to a DCF analysis. In fact, to qualify as a by-pass this must be the case. This means the value of the tract in relation to surrounding tracts with which it may be mined must be considered. What mining unit boundaries should be used and what percentage of the value of the mining unit should be attributed to the small tract? It can be readily seen that estimating the FMV of small tracts is subject to considerable uncertainty.

Unfortunately, small tracts present an additional special problem over and above the estimation of FMV. Many small tracts adjoin ongoing operations which sell coal under long-term contracts negotiated in the past. In this situation it may be difficult to capture revenue equalling an estimate of FMV based on today's market price for coal, but to do otherwise constitutes a subsidy of the coal user.

If an existing contract allows the pass through of royalties and not bonus bid payments to the customer, then the only way the government can capture producer rent is through the bonus (or taxes). However, many of the small tract lease sales have been offered and accepted with high royalties to avoid losing sales because of the inability of a company holding a contract to deliver coal to pay the full bonus amount. There is a drawback to this approach. If other non-Federal leases in the area contain provisions for escalation of royalties to match the highest Federal royalty, new high Federal royalties force up the price of more of the coal mined in that area than just that involved in the Federal sale. For those sales where the Department specifies higher bonuses and lower royalties to avoid this phenomenon, the bidders may not be able to pass through the increased costs and therefore may not bid. In sum, then, the Federal government is put in the position of accepting less than the full rent or risking by pass sales failures or local coal price increases.

Most of the Department's leasing actions for the last 6 years have involved small tracts. Until such time as a new long term leasing system is in full operation most of our lease actions will continue to be small tract oriented. In those areas where Federal coal ownership is limited or interspersed with non-Federal or previously leased Federal coal, there will continue to be small tract problems within the long-term system. It is therefore critical that the Department develop adequate methods for addressing small tract problems.

Recommendations

The task force on fair market value developed a number of recommendations for changes in current procedures and for further studies of problem areas. These recommendations and further studies include:

- (1) - To the extent possible and in a cost-effective fashion, develop a marketplace for Federal coal leases that attracts more than one bidder per tract. Competition is the surest way to

capture producer rents (surplus profits). A rent capture policy without a competitive market-place would likely conflict with other objectives of the program, namely resource conservation and meeting the requirements of the National Energy Plan. Concepts currently under study within the Department which would likely increase the extent of competition include intertract bidding, guaranteed legal access to lease tracts, and offering Federal coal tracts in units including adjoining non-Federal coal. The results of these studies should be closely watched and the necessary support provided to them.

- (2) - Major efforts should be made to improve present methods for evaluating small tracts.
- (3) - As part of the normal process for conducting sales, public comment should be solicited on the elements of the evaluation procedures which affect estimates of FMV. These comments should be considered prior to commencement of evaluations.
- (4) - A detailed study should be made based on industry records, of the rate at which anticipated cash flows from mining should be discounted to present value together with a study of the conceptual relationships of the risk, inflation, financial, and real return components of discount rates.
- (5) - The CREV income approach lease value estimate should be supplemented with a documented comparable sales lease value estimate. In each case the usefulness of market data would be determined and documented on an appraisal-by-appraisal basis.

- (6) - As a priority item, the uncertainties inherent in the government's income and market approaches to evaluation of FMV should be more rigorously investigated.
- (7) - Inflation of coal prices and coal mining costs should be incorporated into the DCF approach to estimating FMV. Methods should be developed to account for the effects of inflation on the elements of the DCF model, particularly the effect on depreciation tax credits.
- (8) - Potential double counting of royalties (calculating royalties on prices which already include royalties) should be recognized in estimating coal prices to be used in DCF estimates of FMV; this could occur when the sample of market prices includes prices which include royalty passthrough components. Methods should be developed for adjusting current coal prices for applicable royalty rate where coal contracts contain royalty passthrough provisions.
- (9) - The FMV of the damages to a qualified surface owner should be based on market value of similar surface estates and damages in non-coal areas; use of market data from non-coal areas would eliminate the consideration of royalties to the surface owner as an element of FMV of damages and costs; this approach should be incorporated immediately into tract evaluation methodologies.
- (10) - The appraisal of FMV of all competitive leases should be documented leases; such documentation should not reveal any proprietary data but, otherwise, should be detailed enough to allow reconfirmation of decisions and, further, should be placed in lease case files after leases are issued.

- (11) - The general practice on new leases of capturing FMV through increased royalties instead of increased bonuses should be discouraged; however, it might be retained for possible application to PRLAs and possibly to readjustments and emergency leases.
- (12) - Development guidelines should be developed for a possible bid-acceptance (reservation price) procedure similar to that used for OCS sales.
- (13) - Industry and public participation information and views on the fair market value process should be sought and applied to the studies recommended above.
- (14) - The Office of Coal Leasing, Planning, and Coordination should continue oversight responsibilities for the above studies.

Should the results of further studies recommended herein indicate restructuring or clarification of agencies' responsibilities, the appropriate documents would be reconsidered to formalize this restructuring.

Decision:

In the decision table, the Secretary is being asked to consider signing the following statement.

"I have reviewed the draft proposals and recommendations of the fair market value task force. I have no objection to these proposals and recommendations, however the task force should continue its studies under the supervision of the

Office of Coal Leasing, Planning and Coordination in order to develop a consensus on implementation of these recommendations before remanding them to the appropriate offices and bureaus or implementation."

Secretary

I desire to personally review proposed implementation actions resulting from the following recommendation(s):

FAIR MARKET VALUE, ECONOMIC RENT,
AND FEDERAL COAL LEASING

Donald J. Bieniewicz
Office of Policy Analysis
U.S. Department of the Interior

Revised Draft: October 17, 1979

I. INTRODUCTION

One of the principal tasks of the fair market value task force is to communicate an understanding of the basic concepts, legal requirements, and policy goals related to fair market value in Federal coal leasing. This is the primary purpose of this paper. Also provided are: a review of the fundamental methods available to the government for achieving these legal requirements and policy goals; an examination of Federal lease market design in practice; and an overview of the use of reservation prices in Federal coal leasing.

II. THE BASIC CONCEPTS AND THEIR RELATIONSHIP

Fair Market Value

According to the Federal Coal Leasing Amendments Act (FCLAA) of 1976, Federal lands offered for coal leasing must be sold via competitive bidding and "No bid shall be accepted which is less than the fair market value, as determined by the Secretary [of the Interior], of the [in situ] coal subject to the lease". Thus, the receipt of fair market value is a legal requirement in Federal coal leasing. Unfortunately, confusion has arisen about the meaning of the term "fair market value". This is partly because of its use by various authors in the literature on mineral leasing to describe what price the government should seek to obtain as a leasing goal, rather than what price it must obtain as a minimum legal requirement.

Fortunately, this confusion concerning the definition of fair market value does not extend into the legal arena. The courts have established the legal definition of fair market value within the body of law dealing with the condemnation of real property by the government under the power of eminent domain.

"Under established law, the criterion for just compensation is the fair market value of the property at the time of taking. 'Fair market value' is defined as the amount in cash, or on terms reasonably equivalent to cash, for which in all probability the property would be sold by a knowledgeable owner willing but not obligated to sell to a knowledgeable purchaser who desired but is not obligated to buy. ... This market value which is sought is not merely theoretical or hypothetical but it represents, insofar as it is possible to estimate it, the actual selling price. As has been judicially declared: 'It is well recognized that where private property is taken for public use, and there is a market price prevailing at the time and place of taking, that price is just compensation.' ... But the measure of compensation is not changed by the lack of active trading. The objective to be reached remains the same, i.e., the price for which the tract in question would sell."*

* Reference 1, pp. 3-5.

Thus, if there is an established market price for a property, then this is its fair market value. If there is no established market price for a property, then an appraiser's estimate of the market price is used, instead. The appraisal methods by which this market price is estimated are also well established in law and are documented in the 1973 report of the Interagency Land Acquisition Conference entitled "Uniform Appraisal Standards for Federal Land Acquisitions." In the appropriation of private lands by the Federal Government, it is the government's appraisal of the market price that legally determines the fair market value. Moreover, the FCLAA of 1976 makes it clear that the determination of fair market value is the responsibility of the government in Federal coal leasing, as well, and specifically identifies the Secretary of the Interior as the government agent responsible. Furthermore, the U.S. Department of the Interior's Departmental Manual states that the 1973 Uniform Appraisal Standards should be used "as a guide by all bureaus and offices" within the Department and that "the appraisal standards are equally applicable to those bureaus that dispose of property on behalf of the United States" (emphasis added).^{*} Thus, a definition of "fair market value" in Federal coal leasing as "the federally appraised market price of the in-situ coal offered for lease" is fully consistent with the current legal and Departmental usage of the term, and will be our accepted definition in the remainder of the paper.

^{*} Reference 2.

There are three principal approaches identified in the Uniform Appraisal Standards for evaluating the market price of a property. These are the comparable sales approach, the income or earnings approach, and the cost approach. Of the three, the comparable sales approach is, where feasible, the preferred method.

In the comparable sales method, a study of "arms length transactions in lands in the vicinity of those taken at about the time of taking" are made. This method is greatly preferred because "it is the only approach to value that reflects the balance of supply and demand in the market place."* In fact, it is the only one of the three methods that directly estimates the market price. Unfortunately, comparable sales data may not be readily available for use in Federal coal lease fair market value determinations.

In the cost approach, the cost of reproducing the item is estimated. This approach is "generally considered to be the least accurate indicator of value" and "the least reliable method of valuation." Also, "the courts have made clear that this approach should never be used 'when no one would think of reproducing the property.'""** This approach has no meaning within the context of Federal coal lease evaluation.

* Reference 1, p. 9.

** Ibid., p.11.

In the income or earnings approach, the worth of an investment-type property is estimated via a discounted cash flow model of projected future earnings. Federal coal leases are investments of the type that can be evaluated with this approach. In effect, this approach is a comparable sales approach, one step removed. In Federal coal leasing, the fair market value we wish to determine is the market price of the coal in situ, i.e., in place in the ground. But there may be no comparable sales data available on the selling price of in-situ coal in the area of the lease sale. However, there may be data available on the selling price of produced coal in the area, and on the cost of coal production in the area. In this case, the price of produced coal and the cost of production can be used in a discounted cash flow model to estimate the net present worth of the Federal coal lease. However, this net present worth is not a direct estimate of the market price of the in-situ coal subject to the lease. In fact, it is a direct estimate of the economic rent of the lease, a value which may greatly exceed the market price of a lease for the in-situ coal.

Economic Rent

"Economic rent," sometimes referred to as "producer surplus" or "excess profits," is a term that comes from classical economic market theory. In coal property evaluation, economic rent is the present value difference between the market price of the mined coal and the costs of producing the coal.* It can also be thought of as the excess

* These costs include opportunity cost which is the lost return on the next best (marginal) investment that would have been obtained had the producer invested his capital resources elsewhere. The opportunity cost is accounted for by calculating the rent in present value terms using the rate of return on displaced investments as the discount rate.

return to a factor of production beyond that needed to bring it into use. The importance of this concept is that under ideal market conditions, the market price for a Federal coal lease would be equal to the economic rent.

Such an ideal market would be perfectly competitive with the following characteristics: numerous risk-neutral* competitors, all equally competent; economic rent not dependent on the winner of the lease; and all competitors having equal access to information about the value of the lease. Several additional market conditions needed for the market price and the rent to coincide are: a deterministic (non-random) rent; no estimation error in competitors' rent estimates; and no costs of entering the market. However, these latter market conditions do not hold in the real world.

Because economic rent will depend on such random factors as future prices and production costs, the economic rent will be probabilistic rather than deterministic. If this was the only market flaw, then the market price would coincide with the expected, or weighted average, rent, rather than with the actual rent that will obtain.

Because of incomplete and differing knowledge of the factors affecting economic rent, competitors' rent estimates will surely differ, with none correctly equaling the actual rent. Thus, on some tracts the

* A risk-neutral competitor is a party who, when the economic rent is subject to random factors, will bid as if the economic rent is not subject to random factors and is exactly equal to the average economic rent.

market price may be too high, and on others, too low. At best, the market price would equal the economic rent only on the average.

In the real world, there are always costs of entering a market including the costs of information gathering, rent estimation, and bid entry. We will call these combined costs the "bid preparation costs." If a competitor wishes to obtain a normal rate of return on his capital investments, he must be able to recover these costs from the profits he makes on the leases he wins. Thus, a bidder will reduce the amount he would otherwise pay for a lease by the total costs of bid preparation he must expend in order to win the lease.*

Together, these market conditions will cause the perfectly competitive market price of a Federal coal lease to equal, on the average, the expected economic rent less the total costs of bid preparation expended to win the lease. Because this is the highest price at which a Federal lease would still be favored by industry over alternative private investments, it is the upper bound on the amount the government can endeavor to receive for a Federal coal lease.**

* Reference 3.

** Note that this is not unqualifiably correct if a lease can be sold using contingency payments, such as royalties or profit-shares (see the footnote on page 11). In such a case, the upper bound on the amount a bidder would be willing to pay is the actual rent, which may be more or less than the expected rent. However, at the time of a sale, the contingency payments must be estimated on an expected value basis, because the actual outcomes upon which they will be determined are probabilistic. Thus in terms of expected government receipts, the above statement remains valid even when contingency payments are possible.

III. FEDERAL LEASING GOALS AND METHODS

As the number of competitors in a market decreases, bidding theory suggests that the winning bidder will obtain an increasing share of the rent.* In fact, when the number of competitors equals one, the market price will drop to zero, if the seller remains willing to sell at this price.** In fact, it is often the case that only a single firm is interested in any specific Federal coal lease. It is presumably because of this factor that Congress put the requirement in the FCLAA of 1976, that no Federal coal lease can be sold for less than its fair market value (FMV).

However, there are other Federal leasing goals that may be relevant to Federal coal lease pricing policy. These can be summarized as follows: promotion of national economic efficiency in the development of the resource (e.g., timely development of the resource otherwise known as resource conservation, and promotion of competition in the coal industry); an equitable sharing of the value of production between

* To simplify the exposition we will henceforth refer to the price obtained in a perfectly competitive market as the "rent," instead of the more proper "expected rent less bid preparation costs," except when the distinction is relevant to the discussion at hand.

** A low number of bids received for a Federal mineral lease is not necessarily evidence of an uncompetitive market; rather, it may suggest that the tract is of generally low value in relation to the cost of preparing a bid for the lease. See reference 3.

the public and producers; environmental protection; socioeconomic responsibility; and national security (national energy supply) considerations. Achieving a favorable balance between these sometimes conflicting objectives lies at the heart of most public mineral leasing issues. It is worthwhile to examine these goals individually to see which are relevant to the question of what price the government should seek to obtain for its coal leases.

A number of analysts have recommended that an ideal Federal mineral leasing system would maximize the economic rent of the mineral leases, and would capture this entire economic rent for the public.* Maximization of the economic rent is argued to be in the interest of national economic efficiency. Capture of the entire economic rent is argued to be the natural goal of a proprietor seeking the highest possible price for the use of his land. These are not inherently conflicting goals. Economic theory suggests that the optimal production plan on a lease is the same regardless of the distribution of the rent between the lessor and the lessee. However, the tools of rent capture are often imperfect and may cause the total rent to be reduced. Before we continue, let us review the methods by which the government can meet its legal obligation to capture FMV, and seek the policy goal of rent capture.

* See reference 11.

As was indicated earlier, fair market value is defined in the Uniform Appraisal Standards as "the amount...for which in all probability the property would be sold by a knowledgeable seller willing but not obligated to sell to a knowledgeable purchaser who desired but is not obligated to buy." There are several ways by which the government can be a knowledgeable seller that would result in FMV receipt or better.

The first method is for the government to appraise the FMV of the lease, usually via a comparable sales method, and then set the minimum acceptable bid, known as the reservation price, equal to the appraisal. This ensures that any high bid accepted will be greater than or equal to the FMV.

A second method is for the government to estimate the expected economic rent of each lease, as well as to appraise its FMV. Then each lease's reservation price can be set by the government higher than the appraised FMV, but lower than the estimated rent, in order to capture a larger share of each lease's rent. Why the reservation price should not be set equal to the government's estimate of the rent will be discussed later in the paper.

A third method is for the government to design a market for selling Federal coal leases that is superior in its competitive aspects to any comparable coal lease market. If such a superior Federal market was developed, then the high bid offered for a Federal coal lease would be, by definition, its FMV, because it would be the most suitable market price upon which to base an appraisal determination of FMV.

A fourth method is to combine the last two methods; i.e., to design a Federal coal lease market that is at least as good as any comparable coal lease market, but to use reservation prices based on the government's expected rent estimates as well. The utilization of reservation prices, by adding an additional competitive element, tends to push each tract's FMV high-bid upward, closer to the economic rent.

A fifth method by which the government can be a knowledgeable seller is for it to use a leasing system that captures much of the economic rent (and FMV) in downstream payments, such as royalties or profit shares,* instead of in the up-front cash bonus payment. This method could be combined with any of the up-front payment methods previously discussed and in-so-doing would reduce the rent-capture burden placed on these other methods. Unfortunately, there are two general types of problems associated with the use of contingency payments: one, because royalties are seen by producers as production costs, their utilization as a rent-capture tool tends to reduce the total rent by inducing lower rates of production and lesser total production than would otherwise obtain. Two, such downstream payments can increase the price of the produced resource. This second problem is of particular concern in Federal coal leasing.

* A royalty, or excise tax, is a share of the gross value of production. A profit share is a share of production value net of costs. These are sometimes referred to as "contingency" payments, because they depend on an outcome that may or may not occur.

For example, in attempting to increase rent capture by increasing the Federal royalty rate, one should be aware of the following:

- The rapid rise in world oil prices since 1973, shortages of natural gas, and problems in the nuclear power industry have resulted in both an increase in the demand for coal and a decrease in the elasticity (i.e., the sensitivity of the quantity demanded to price changes) for coal to be used in new electrical power generating plants.*
- To the extent that private coal royalty rates are keyed to the Federal coal royalty rate, and demand for coal is inelastic, a uniform increase in the Federal coal royalty rate tends to induce an equivalent increase in the price of U.S. coal. What this means is that the increased royalty payments may be passed along to coal buyers as a price increase, and ultimately borne by consumers in the form of higher electricity costs.**
- To the extent that private coal royalty rates are not keyed to the Federal coal royalty rate, and demand for coal is inelastic, private coal tends to be more attractive to producers than Federal coal as the royalty rate on Federal coal rises. This means that increasing the Federal coal

* See reference 10.

** We have been informed by industry sources that this pass-along has occurred on short-term Federal coal leases sold with higher than 12 1/2% royalty rates.

royalty rate may induce greater production of private coal having potentially higher environmental costs than the screened Federal coal offered for lease.

- By raising the price of this Nation's coal, a higher Federal coal royalty rate would tend to reduce U.S. coal exports and to increase coal imports.

Because of these problems, it may be undesirable to use a royalty rate higher than the legally mandated minimum of 12 1/2% as a rent-capture tool in Federal coal leasing.* However, in theory at least, by adding a fixed profit share to the leasing system, higher contingency payments could be obtained without significantly distorting the price of produced coal, although at some additional administrative cost.

The above analysis of the use of the royalty rate as a rent-capture tool reveals a problem with the suggested leasing goal of rent maximization. In fact, if national economic efficiency is desired, then maximization of economic rent plus consumer surplus is the proper leasing goal. Consumer surplus is the value difference between the amount that buyers are willing to pay, and the amount that they actually have to pay, to obtain their purchases. By using a higher royalty rate on Federal coal, the government would be increasing (and capturing)

* This legal minimum applies only to surface-mined coal. The current royalty rate on underground-mined coal is set at 8% by DOI policy.

the economic rent of coal producers, but by increasing the price of coal it would be decreasing the consumer surplus of coal purchasers. However, where the price of the mineral being leased is not affected by government leasing policy, consideration of consumer surplus is not necessary. This is the case in Federal Outer Continental Shelf (OCS) oil and gas leasing, where the price of crude oil is determined essentially by OPEC pricing and production policies. This explains the usual policy recommendation that maximization of economic rent should be a government mineral leasing goal, because most of the analyses supporting this recommendation have been based on the OCS or other oil lease markets.

The commonly associated recommendation that the government should seek to capture the entire economic rent should also be somewhat qualified. The policy argument is based on classical economic theory which suggests that economic rent is a surplus, whose capture would not affect output decisions or the selling price of the produced mineral. However, capture of the entire economic rent, where the rent is measured based on the price of coal seen in the market prior to the lease sale, removes the potential for Federal coal producers to underprice their competitors as a market-entering strategy. In other words, where rents exist in a system, there is an opportunity for prices to go down. Where there are no rents, this opportunity does not exist. So in a dynamic sense, rent capture by the government can affect prices. However, because the government will not be able to capture the entire rent, and the government does not control the

entire national coal supply, the natural dynamics of prices in the Nation's coal markets are unlikely to be significantly compromised by a Federal rent capture goal.

Also, for some hard-to-find minerals, exploration and technology development costs not directly related to the actual mineral development may have to be recovered from the economic rent of producible finds.

It may properly be argued, however, that economic rent is poorly defined in the above case, and that such exploration and technology development costs should be included in the cost base when computing the rent. Because coal is a relatively common mineral, and has a mature mining technology, non-specific exploration costs and technology development costs can probably be safely assumed to be insignificant when estimating coal lease rents, or these costs can be included under production costs as overhead.

Let us complete our review of Federal coal leasing policy goals to see if there are any other potential conflicts with a rent-capture goal. The remaining goals to be discussed are environmental protection, socioeconomic responsibility, and national security considerations.

It can be assumed that tracts offered within the current coal management system will have passed an environmental screening and ranking, and that whatever additional environmental protection is deemed necessary is provided through lease stipulation and regulatory monitoring. It can also be assumed that socioeconomic factors, such as boom-town effects, will be considered in the determination of regional Federal coal leasing

targets. Under these circumstances, there is no general conflict of a Federal rent-capture goal with Federal goals of environmental protection and socioeconomic responsibility.

Because domestic coal can substitute for imported oil to fuel domestic electrical power generating plants, the leasing of Federal coal has national security implications. However, unless the method selected by the government to capture rent has the unlikely effect of preventing the government from achieving its coal leasing targets, there should be no significant conflict of a rent capture goal with the government's national security goals.

Thus, it appears that a rent-capture goal would not significantly conflict with any other Federal coal leasing goal, assuming no rent capture methods are used that would distort the price of produced coal. At a minimum, capture of a share of the rent equal to the FMV is legally required.

IV. FMV IN PUBLIC TAKINGS VS. FMV IN PUBLIC SALES

As developed within the context of public takings, the principles of FMV tend to modestly favor the "public" over the private interest. For example, the Uniform Appraisal Standards state that if there is "a market price prevailing at the time and place of taking, [then] that price is just compensation." This allows the government to "buy" a property without having to pay "the enhanced price which its

demand alone has created."* Nor may personal measures of worth, e.g., sentimental value, be considered in estimating the FMV of the taken goods. Also, some consequential private costs of the taking, e.g., moving costs, cannot be included in determining "just compensation."**

As stated above, principles of FMV tend to favor the government in cases where the government is the "buyer," e.g., in condemnations. However, when the Federal government is the seller instead of the buyer, the public is not so well-served by a definition of FMV that tends to favor the buyer. Among the difficulties associated with the definition of FMV and its use as a fixed minimum selling price in Federal coal lease sales are:

- the implied assumption that the market price is not affected by the sale of the leases being appraised. Federal coal lease sales may have a considerable impact on coal lease prices.
- the treatment of the FMV as a certain value. A proper bid acceptance decision rule should consider the quality of the market price estimate used to determine the FMV, otherwise bids may be inappropriately rejected.
- the rigid requirement of full FMV payment. This does not allow the Secretary the flexibility to consider any other measure of

* See reference 1, pages 4 and 17.

** The government is becoming increasingly responsive to the fact that a government condemnation proceeding is more a "willing buyer-unwilling seller" situation than a "willing buyer-willing seller" situation. For example, the National Park Service now provides resettlement compensation for families living within the boundaries of a National Park whose homes are taken by the government. However, this resettlement compensation is evaluated and paid separately, and is not considered to be part of the FMV compensation for the property.

the social benefits of bid acceptance, such as timely development of the resource, if the high bid should fall below the FMV.

- the sensitivity of the market price, and thus the FMV, to existing market imperfections. These imperfections are just those items that dictate that the market price of a lease is less than the economic rent in the real world, i.e., lack of numerous risk-neutral bidders, etc. The use of an imperfect-market-based FMV as the reservation price may cause the government to sell a coal property for far less than the expected economic rent of the property.

The sensitivity of the market price of a coal lease to market imperfections, however, also represents an opportunity for the government. In public takings, there is only one market upon which to base an FMV determination and this market cannot be modified by the "seller" to obtain a better market price, i.e., a better FMV, for his taken property. However, in Federal coal lease sales there are two markets upon which to base an FMV appraisal — the existing private coal lease market and the Federal coal lease auction market — and the latter market can be modified by the government to reduce some of the anti-competitive distortions that exist in the private coal lease market to the point where prices generated in the Federal coal lease market may generally exceed those in the private market. In such a case, most of the concerns associated with the use of the FMV as the reservation price in Federal coal lease sales would be allayed.

If the Federal government can develop a market that is more competitive than the best comparable private coal lease market, then the high bid received for a Federal coal lease would be the best available measure of its market price, and thus of its FMV. The legal requirement for obtaining FMV would be met automatically, and the administrative cost of a presale comparable-sales-based appraisal could be saved. In such a case, a presale appraisal would serve only to reassure us that the high bid was indeed the best FMV estimator available. The problems noted earlier, concerning inappropriate rejection of offers for not having achieved FMV, e.g., from the government's overestimation of the market price in determining the FMV, would be eliminated. Best of all, the market price achieved in the Federal coal lease market, which is now synonymous with the FMV, would be generally increased so that the government would capture a greater portion of the expected economic rent of each leased property. Based on these observations, an obvious strategy is for the government to design a coal lease market that is as perfectly competitive as possible.

V. FEDERAL LEASE MARKET DESIGN IN PRACTICE

An example of an existing, competitive market design is the Federal Outer Continental Shelf (OCS) oil and gas lease market. The basic market is a sealed bid auction with a fixed royalty rate or schedule. There are numerous potential bidders, even though market entry costs, in terms of presale information gathering and analysis costs, the cash bonus payment, and postsale exploration costs, can range in the tens of millions of dollars.

The eight largest oil producing firms are precluded from joint bidding* with each other in order to maintain the size of the bidding pool and to somewhat equalize capital resources across bidders. Smaller firms are allowed to joint bid with these eight largest firms or with each other. In fact, some of the consortia of smaller firms have been very effective at winning leases.

On wildcat leases, information access is equally available to all potential bidders. Any firm is free to run seismic surveys. Presale stratigraphic drilling data is, by regulation, available to all who wish to purchase it.**

Although the division of hydrocarbon reservoirs by tract boundaries would normally cause a considerable reduction in lease value, this is averted in frontier areas by government mandated unitization of all reservoirs, and in previously leased areas by the legal right of any lessee to force unitization when his lease is being drained by another. Under a unitization plan, each reservoir is produced as a single economic unit with each lessee sharing in costs and profits

* Joint bidding is actually precluded among firms that exceed a specified rate of oil and gas production, rather than among the eight largest, per se.

** One minor flaw in this market is that besides selling mineral rights, the government is also selling information rights by allowing winning firms to keep secret for several years the drilling information on their leases. This gives firms who can drill into reservoirs that extend into adjacent tracts a major advantage over other bidders for these "drainage" tracts. But because all drilling information is turned over to the government, the government's reservation price can be set to force the adjacent owner to make a fair offering for the drainage tract. However, a better solution might be to simply require that all drilling information on Federal OCS lands be made public immediately, as a condition of the lease.

in relation to his lease's contribution to the economic worth of the unit. Thus, the value of the lease is independent of the winner of the lease.

Considerable uncertainty exists as to the actual amount of hydrocarbon resources present. However, because the basic trapping mechanisms are understood and can be identified through seismic analyses, probabilistic estimation of the rent value of a lease is feasible. This approach to rent estimation is used by both the government and industry.

In design, the Federal OCS oil and gas lease market approaches the theoretical requirements of a perfectly competitive market. Historically, it has shown itself to be highly competitive and to have effectively captured the economic rent of leased OCS properties for the public.*

An example of an existing, uncompetitive market is the short-term Federal coal lease market. Several auction design approaches have been used in attempts to improve this market:

- sealed bonus bid with fixed legal minimum royalty rate
- sealed bonus bid with fixed royalty rate adjusted upward to drive the Coal Resource Economic Value (CREV - the

* See reference 4.

government's estimate of the "most likely" rent value of the lease) to \$25/acre, the minimum acceptable bonus bid

- sealed bonus bid followed by an oral auction.

Although there are numerous potential bidders for such coal leases, in most cases there is only one actual bidder. On-site information gathering costs are not particularly high compared to the OCS case; however, it may be impossible to gather information on contiguous coal deposits because of the scattered or checkerboard pattern of coal ownership in parts of the West. This ownership pattern, in combination with the large coal deposit size needed to achieve coal production scale economies, often causes Federal coal to be of value only to one potential bidder — the owner of the contiguous coal deposit. If the contiguous coal is in production, there should be little uncertainty concerning the salability (i.e., the price) or the production cost of the Federal coal, as evaluated by the contiguous coal owner. However, when for all practical purposes there is only a single potential bidder, then regardless of the auction design used, the market for a short-term Federal coal lease will not be competitive.

This fundamentally uncompetitive market structure will also be a major problem in long-term Federal coal leasing. One solution to this problem is for the Federal Government to sell its coal, together with nearby private coal, in units large enough to achieve coal

production cost efficiencies.* In such a unit, the Federal coal would now have roughly the same rent value to all competent coal-producing firms. Steps would also have to be taken to ensure equal availability of coal resource information to all potential bidders. Other possible governmental actions that would tend to create a competitive environment by increasing and equalizing lease value among potential bidders include: requiring transferable surface owner consent**; guaranteeing access rights for rail lines, roads, etc.***; and governmental brokerage of coal contracts to reduce price and contract uncertainty.

Another conceivable approach takes into consideration the fact that the government has much more coal than it wishes to sell. If there are many potential bidders, each capable of producing efficiently at least one of the many possible leases in an area, competition can be achieved by holding an "intertract" auction for the right of the high bidder to produce his most favored lease.**** Before each sale, the favored properties could be delineated by the government based on industry nominations, or could be delineated directly by the potential bidders. In the latter case, because of greater private manpower and information availability, the delineated

* See reference 5, chapter 5.

** This is a current Departmental policy.

*** A study on this subject is currently undergoing review within the Department.

**** Procedures for "intertract bidding" are currently being developed by an interagency, inter-Departmental task force.

tracts should have higher rents for capture by the government through its lease market.

VI. THE USE OF RESERVATION PRICES

An additional method by which the Federal Government can seek to obtain a larger share of the economic rent is for the government to become a player in the market. Based on its own estimate of the lease's rent and information from the lease auction itself, the government can set a "reservation price" for each lease, above which the high bid would be accepted, below which it would be rejected.

A general functional form for the reservation price would be KG , where G is the government's estimate of the expected rent, and K , ranging $0 < K < 1$ is a multiplier dependent on at least the following factors:*

1. The United States Geological Survey (USGS) estimate of the expected rent, i.e., G .
2. The information content inherent in the submitted bids with regard to tract value.
3. The number of potential bidders and the number of actual bids received.
4. The social cost of bid rejection and the cost to the government of bid rejection.
5. The degree of estimation error in the rent estimates made by bidders and by the government.

* This list is a modification of a list appearing on p. 2 of reference 6.

6. The degree of risk aversion and the form of firms' bidding strategies.
7. The historical relationship between USGS' rent estimates and the high bids in the particular sale area under consideration.
8. Experience with rejected tracts that were subsequently reoffered for sale.
9. The effect of bid rejection criteria on bidding behavior.
10. The bargaining strength of the government.
11. The comparable sales analysis estimate of the market price, and the quality of the comparable sales data used.
12. Firms' bid preparation costs.
13. The government's other leasing goals, and its administrative costs of leasing.
14. Advantages held by private in-situ coal over Federal in-situ coal, such as its immediate availability to the market.
15. The demand for coal leases in the sale area.

Let us examine how K would depend on these factors. For example, as the number of bids received, i.e., the observed competition, went up, more dependence could be placed on the market to force the rent to be bid away, and less dependence would need to be placed on the government's expected rent estimate, G . Thus, as the number of bids increases, K should decrease.

In another example, as the degree of estimation error in G increases, as measured by its variance, the risk of inappropriate bid rejection increases. Thus, as the variance of G increases, K should decrease.

In addition, the relationship between bid value and downstream government revenues should also be considered in setting K. For example, because bonus payments are tax deductible, if a bid is strategically decreased by the bidder, then the tax deduction is reduced also, so that the government will gain greater tax revenues from leasing the property. Thus K could be set somewhat lower as compared to the case where bonus payments were not tax deductible.

In order to avoid ostensible arbitrariness in acceptance-rejection decisions, the procedures for combining the government's rent estimate and the sale information to determine K should be established presale and be made available to the public prior to the auction. Then, using these announced procedures, each lease's reservation price would be determined automatically after its sealed bids were opened. A major strength of this approach is that it enables essential bidding information to be incorporated into bid rejection decisions.

The utilization of reservation prices is a particularly useful counterstrategy when the number of bids is expected to be low and a bidder might attempt to win a property with a bid much lower than his evaluation of the property's worth. However, the more competitive the Federal lease market, the less there is to be gained through strategic bid rejection. In fact, the less dependence placed on this latter approach, the better, because of the additional costs it imposes on the leasing process. These costs include the administrative cost of rent estimation, and the social cost of not leasing tracts that should properly

be leased. Social costs may be in the form of bypassed or delayed production, induced production of environmentally and economically inferior coal, and reduced government revenues. These costs are caused by the inevitable presence of estimation error in Federal estimates of the expected rent, and by the quality of the procedure used to set reservation prices.

Design of a good reservation price procedure requires a comprehensive understanding of the benefits and costs of rejecting bids. This is an exceedingly complex subject. However, it is possible to develop reservation price-setting rules that are remarkably simple yet robust.

An example of a simple and effective reservation price procedure is that used in OCS lease sales. The OCS rules explicitly consider the first four theoretical factors for setting K as listed previously, and implicitly consider the fifth and seventh factors listed. The USGS estimate of the expected rent, the submitted bid values, the number of bidders, and the potential loss in government receipts are all direct components in the reservation price procedure. The degree of estimation error in the government's rent estimate also appears to be considered, but implicitly and without formula.*

* The sum of the USGS tract value estimates in an OCS lease sale is typically from 20 to 60 percent of the sum of the high bids. (See reference 7, Table 9). Thus G , on the average, tends to be less than the high bid. If we assume that the high bid is, on the average, equal to the expected economic rent, then the lower average level of G when compared to the high bid is equivalent to a reduction in K similar to that which could result from direct consideration of the government's estimation error.

Although the OCS reservation price procedure differs considerably in appearance from the theoretical form previously described, its functional properties are very similar, and, as applied, it appears to be remarkably close to ideal.*

However, the procedure used to reject bids in short-term Federal coal lease sales has potential for improvement. Only a single factor, the USGS estimate of the "most likely" rent, referred to as the Coal Resource Economic Value (CREV), is considered, and it is used directly as the reservation price. Even when only a single bid is received, as is commonly the case in short-term sales, consideration should also be given to the social cost of bid rejection and the degree of estimation error in the government's rent estimate, when setting a reservation price. There are several possible reasons why these factors are presently not explicitly considered. First, the social cost of bid rejection is different for coal than it is for offshore oil and gas, and the manner in which to trade-off this cost is considerably more complex.** Second, the degree of estimation error in the OCS rent estimate is handled implicitly in the OCS reservation price procedure, and thus its direct consideration in the Federal coal reservation price procedure has lacked visible precedent. Third,

* See references 6 and 8 for an explanation and an in-depth analysis of the OCS reservation price procedure.

** For example, if the government sets its reservation prices too high, firms may choose to bypass the Federal coal and this coal may be, in effect, lost to society.

because comparable sales data had been presumed to be generally available, the income approach, i.e., the CREV, is used to estimate the market price. Unfortunately, an incomplete understanding of the tendency for the income approach to overstate the market price of in-situ coal leases has led to the minimum acceptable bid being set exactly equal to the CREV.

Contrary to the situation on the OCS, the best means of showing that the legal requirement of FMV receipt is being met in short-term Federal coal lease sales would be via comparable sales-based appraisals. On the OCS this is unnecessary, because the Federal OCS lease market is highly competitive and represents the best, in fact the only, market suitable for evaluating the FMV of each leased tract. However, most short-term coal lease sales are not sufficiently competitive, having only a single potential bidder, to serve as a basis for internal appraisal determinations.

Because the government is in a stronger bargaining position than most private coal lease sellers, we should expect that the economically appropriate reservation price for a Federal coal lease would exceed the price that would be obtained by a private seller of a similar property. However, in no case would the reservation price equal the full expected rent estimate, because of the risk of inappropriate bid rejection from inaccuracy in the government's rent estimate.

An improved short-term coal lease sale procedure would be equally applicable to long-term Federal coal lease sales. However, comparable sales-based appraisals would no longer be needed if a highly competitive long-term Federal coal lease market is developed. Also, if intertract bidding is used, then the reservation price procedures should be modified so that each tract's reservation price would also be a function of competing bids received on other tracts offered in the sale.

Another strategy that could possibly increase rent capture is for the government to announce its estimate of each lease's expected rent before the sale. Such a presale announcement, by reducing the degree of estimation error in bidders' rent estimates, might tend to make the market more competitive. After the sale, the reservation price procedure could be used, as usual, for bid acceptance.

In the special case of only one eligible bidder, a simplification of the above strategy is possible. Because the bidding information obtained at the sale would have a very weak effect, if any, on the value of K , the reservation price could be determined prior to the sale. Thus, the government's reservation price, rather than the government's estimate of the expected rent, could be announced prior to the sale. The bidder would then know with certainty if his bid would be accepted, and would make fewer underbidding errors. This would allow the reservation price to be set somewhat higher than it would be set if the reservation price was not announced presale. An analysis for the case where the government

is an unbiased (i.e., tending to be correct on the average) estimator of rent, concluded that such a presale announcement would tend to increase government rent capture.*

VII. SUMMARY

In Federal coal leasing, fair market value (FMV) refers to the federally appraised market price of the unmined coal offered for lease, and represents the lower bound on the payment the government can legally accept in exchange for its property. Economic rent is defined as the present value difference between the market price of the mined coal, and the cost of producing the coal. Under ideal market conditions, the market price for a Federal coal lease would be equal to the economic rent; however, several of the necessary conditions, e.g., rent must not be a random variable, do not hold in the real world.

In theory, these inevitable non-ideal market conditions would cause the perfectly competitive market price of a Federal coal lease to equal, on the average, the expected present value economic rent less the bid preparation costs expended to win the lease. Because this represents the highest price at which a Federal lease would still be favored over alternative private investments, it is the upper bound on the amount the government can endeavor to receive through Federal lease market design, or otherwise, for its leases.

* See reference 9.

Besides the legal requirement that FMV must be received, there are several Federal leasing goals which may be relevant to Federal coal lease pricing policy, including: promotion of national economic efficiency in the development of the resource; an equitable sharing of the rent from production of a lease between the public and producers; environmental protection; socioeconomic responsibility; and national security (national energy supply) considerations.

It has been suggested that it would be in the interests of economic efficiency and equity to pursue as leasing policies the maximization of lease rents and the capture of these rents by the Federal Government.

In Federal coal leasing, this joint policy may need to be modified to exclude rent-capture methods that would increase the price of produced coal, e.g., the utilization of a royalty rate higher than the legal minimum of 12 1/2%. It is unlikely that a rent-capture goal in Federal coal leasing would significantly conflict with leasing goals of environmental protection, socioeconomic responsibility, and consideration of national energy needs which are met within the current coal management system via environmental screening and ranking of lease offerings, lease stipulations, regulatory monitoring, and the determination of regional Federal coal leasing targets.

There are several methods available to the government for the capture of FMV and rent in Federal coal leasing, including: use of a minimum acceptable bid, known as a reservation price, set equal to the comparable sales-appraised FMV; use of a reservation price set above

the appraised FMV, but below the government's estimate of the expected economic rent; use of a Federal coal lease market, superior in its competitive aspects to the market used for comparable-sales appraisals, to generate high bids greater than the prices observed in the comparable-sales market; use of a superior Federal coal lease market along with a reservation price whose magnitude is based on the government's estimate of expected rent; and lastly, use of a leasing system that captures much of the rent (and FMV) in downstream payments, e.g., royalties or profit shares, in combination with one of the above approaches. The use of a rent-estimate-based reservation price, in combination with a superior Federal coal lease market, offers the greatest advantages; however, because of problems in generating competition, at least in the short term, an appraisal based on comparable sales data is also advisable to ensure that FMV is received.

Within the context of public takings, the FMV of a property is not subject to control by the "seller," but is based on observations of previous similar transactions in the existing private market. However, within the context of Federal coal lease sales, the FMV is subject to control by the seller, the Federal Government, in that the government can design its coal lease market to reduce some of the anti-competitive distortions that exist in the private coal lease market to the point where prices generated in the Federal market may generally exceed those in the private market.

Although there are numerous potential bidders for each Federal coal lease, in most cases there is only one actual bidder. The scattered or checkerboard pattern of coal ownership in parts of the West, in combination with the large coal deposit size needed to achieve coal production scale economies, often causes Federal coal to be of value only to one potential bidder -- the owner of the contiguous coal deposit. Potential solutions to this problem include presale unitization, i.e., the selling of the Federal coal along with nearby private coal in units large enough to achieve coal production cost efficiency; and intertract bidding, wherein the high bidder wins the right to produce his most favored lease of those offered by the government. Other possible governmental actions that would tend to create a competitive environment by increasing and equalizing lease value among potential bidders include: requiring transferable surface owner consent; guaranteeing access rights for rail lines, roads, etc.; and governmental brokerage of coal contracts to reduce price and contract uncertainty. Leasing strategies that may increase the share of the rent captured by the government include careful reservation price design, and selective presale announcement of Federal lease value estimates.

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The Key Issue in Federal Coal Lease-Pricing Policy

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There appears to be a large difference between the current long-term-contract price for mined coal and the estimated cost of producing coal on the best Federal coal lands which are soon to be made available to the market. As Federal coal leases become available in increasing number, the selling price of mined coal should drop in real terms as competition for coal production contracts drives higher cost coal from the market. Ultimately, because of the vast supply of low cost Federal coal, the contracted f.o.b. price* should again approach, as has been historically the case, the unit cost of production plus a minimal, competitively-determined rate of return on capital invested in coal production, with no excess profits (rents) in the system.** The key issue facing the Department is what Federal coal lease-pricing policy would be best to follow during this time period of decreasing real contracted f.o.b. prices wherein large rents may possibly exist on Federal coal leases.

Unfortunately, the traditional royalty and reservation price methods used by the Department to capture excess profits in Federal OCS oil and gas lease sales are unlikely to prove satisfactory for Federal coal lease sales for the following reasons:

- Regardless of the degree of excellence of the government's discounted cash flow coal lease rent-evaluation model, the correctness of the government's estimates of lease rents will be, at best, uncertain. This

* The price delivered "free on board" a railroad freight car.

** Electric Power Research Institute Report EA-497, "Coal Price Formation", December 1977.

is because the size of the rents is very sensitive to the f.o.b. price resulting from the lease sale — and this price is very uncertain. For example, if sufficient Federal coal is leased, the f.o.b. price could drop so far that, in theory at least, there may be no rents from coal production on the leases sold. However, if the quantity of Federal coal leased is not sufficient to drive all higher cost coal from the market, the resulting f.o.b. price could be anywhere between rock bottom at the production cost of the newly leased coal plus a minimal return on investment, and the much higher f.o.b. price seen prior to the sale. Unfortunately, satisfactory models for predicting a transitional f.o.b. price do not exist and are unlikely to be developable. Because of this, the government's estimates of lease rents could conceivably be off by several orders of magnitude.

- Whatever reservation prices are set will always appear to be correct. The degree of error in the government's estimates of lease rents used to set the reservation prices will not be revealed because bidders may pay whatever reservation prices are set. This is because of the tight control the Federal government has over a major part of the supply of the best western coal. As long as the reservation price is less than the difference between production cost (including an adequate return on investment) and the current f.o.b. price, it can be paid and the resource produced profitably. However, the f.o.b. price of such coal must be accordingly higher than it would be with lower reservation prices.

- In theory at least, social welfare maximization occurs at the point of competitive equilibrium of unrestricted national coal supply and demand.* At this point, the greatest amount of coal will be produced at the lowest possible cost and the f.o.b. contract price for coal will equal its production cost plus a minimal, competitively-determined rate of return on the capital invested in coal production. The use of royalties and reservation prices in an attempt to capture transitional rents will, at best, slow the movement towards this equilibrium f.o.b. price.
- Even worse, once high reservation prices and royalties are used, they may be locked into the system for an indefinitely long period, effectively halting movement towards the equilibrium f.o.b. price. Once obtained, high reservation prices could set a precedent for fair market value determinations in future Federal coal lease sales. Thereafter, the government may be legally bound to obtain payment for its leases at similarly high levels.

The basic weakness of the traditional royalty and reservation price approach is that it assumes that the price of the produced mineral is insensitive to the manner in which it is leased in-situ by the government. While this is a reasonable assumption for the leasing of Federal oil and gas properties, it appears to be inappropriate for the leasing of Federal coal properties. The rate of offering and method of pricing of Federal in-situ coal will have a dramatic effect on f.o.b. coal prices. Acknowledgement of the dynamic,

* Assuming insignificant external costs of coal extraction.

interactive nature of Federal coal lease-pricing methods and f.o.b. coal prices is essential to recognition of a superior Federal coal lease-pricing policy.

Based on this observation and consideration of what leasing approach would allow for unrestricted movement of the f.o.b. price towards its competitive equilibrium-determined minimum while providing the government with as large a share of the residual rents in the system as possible has lead to the following suggested policy:

- The Federal Government should rapidly offer the highest-quality, lowest-cost Federal coal tracts in each region in sufficient number to allow the amount of coal produced to be similar to that which would occur in an unrestricted market. The goal is to generate quickly postsale markets wherein f.o.b. coal prices would be determined based on the extraction costs of the new low-cost Federal coal with all rents squeezed into lower f.o.b. prices.
- The Federal government should work to ensure that coal from Federal leases is contracted to be sold at cost plus only a reasonable return on investment. One policy tool for such action is that the Federal government can require in its leases that produced coal be sold at "reasonable", i.e., presumably not exorbitant, prices. Due caution is advised here, though. It is best to rely on a competitive postsale market to determine what is a "reasonable" price or a reasonable return on investment. Additionally, there is strong evidence that utilities examine a potential producer's mining costs very carefully before awarding a contract; thus, purchase and production of Federal coal leases by

utilities is always an available option. We should expect that these factors will work to very quickly pull f.o.b. prices in line with the lower production costs on new Federal coal.

- By not utilizing reservation prices in an attempt to capture directly the quasi-rents which may temporarily exist, the Federal Government would obtain several benefits beyond that of allowing for further unrestricted downward movement of the f.o.b. price. First, the administrative cost of detailed tract evaluations would be saved. Second, approximately half of any excess profits that result, including excess profits on private coal developed in conjunction with the leased Federal coal, would be captured via Federal corporate income taxes. Third, several beneficial types of industry behavior may result. Firms are encouraged to buy Federal coal leases in order to capture these quasi-rents which would tend to raise the level of competition and the bid levels for offered Federal coal tracts. Also, the temporary existence of quasi-rents may induce a greater number of outside firms to enter the coal industry, strengthening its general competitiveness and resulting eventually in a lower competitively-determined "normal" rate of return on investment in the industry and lower f.o.b. prices to consumers than would occur in a less well-realized competitive market equilibrium.
- Tracts should be offered at no higher than the minimum legal royalty rate of 12.5% for surface coal and the current administratively-determined rate of 8% for underground coal. These royalty rates appear to exceed rates observed

in the private market for coal leases and thus would meet legal requirements for receipt of fair market value. Bonus payments obtained by private lessors are generally minimal. Higher than 12.5% royalty rates will tend to cause an even higher f.o.b. equilibrium price and are undesirable. Even at 12.5%, de facto incentives are provided for the development of non-Federal coal having higher production costs, and potentially higher environmental and socioeconomic costs, than the best Federal coal, but which can be sold for a lower f.o.b. price than the best Federal coal, because it can be leased and developed at a lower than 12.5% royalty rate. Thus, only if the cost of Federal coal production is significantly (equal to the full Federal royalty payment differential) lower than the cost of production on private coal would Federal coal have an edge in the lease market. If Federal coal at such royalty rates is capable of driving all other coal from the market, then the government's royalty receipts should be considered to be quasi-rents existing only because of its monopolistic power to withhold these Federal leases from the regional supply. It is likely that such quasi-rent royalty payments would greatly exceed any true differential rents caused by quality differences in the best Federal coal leasable within a region.

- If reservation prices that vary by tract must be utilized, then these reservation prices should be set directly equal to a highly conservative governmental estimate of the expected rent less estimated bid preparation costs. Although theory suggests that a proper reservation price should be less than the estimated expected rent (and we were able to identify numerous factors supporting this qualitative assessment and several policy tools by which such an adjustment could be made), the degree of adjustment necessary is unknown based on available data.

In this case, the only reasonable alternatives are either to discard the utilization of a differential reservation price approach, or to set such reservation prices based on highly conservative assumptions in the calculation of lease rents, i.e., low f.o.b. price, high production costs, and high discount rate. A suggested approach for estimating a conservative f.o.b. price will be presented subsequently. Based on available coal production cost data, a "high production costs" standard is readily developable. A conservative discount rate would be one based on the higher rates of return commonly utilized in coal project planning rather than on the average rate of return evidenced on completed projects or on the weighted average cost of capital to the industry.

- If reservation prices must be utilized, these reservation prices should aim to capture non-monopolistic rents only. The government's expected rent estimates should be calculated using an estimate of the equilibrium f.o.b. price in the sale region under the assumption that the supply of Federal coal was essentially unrestricted. This would tend to avoid reservation-price-caused locking-in of an f.o.b. price above the competitive equilibrium level.
- If a Federal coal lease sale is likely to meet the regional demand, then the f.o.b. price to use in estimating the expected rent of each tract offered is a conservative (low) estimate of the unit production cost (including estimated capital investment cost and a competitively-determined rate of return on invested capital) of the most-expensive-to-mine (as part of its logical production unit) Federal coal tract which is likely to be leased and produced. In general, assuming Federal

coal is the least-costly-to-mine coal in the region, then the equilibrium f.o.b. price can be estimated by the unit production cost of the marginal Federal mine after Federal coal leasing drives all higher cost coal from the regional market.

- The government's estimate of tract value should yield to a truly competitive market determination of tract value. A bid-averaging rule, such as that used in Federal Outer Continental Shelf (OCS) oil and gas leasing, or a similar rule should be used to lower discounted cash flow-based reservation prices as the number of bids increases on a tract. This would greatly increase the robustness of any reservation price procedure utilized in Federal coal leasing.
- Where the administrative costs of lease evaluation and reservation price determination exceed the expected incremental rent-capture gain from these procedures, then the government should instead use a flat-rate minimum acceptable bonus bid, standardized for all such tracts in a sale, as the reservation price.
- Where adjacent private coal production is ongoing, such that bypassing a Federal tract would result in effective loss of the Federal resources, and royalty and bonus payments for the Federal lease would likely be passed through to the consumer rather than being paid from producer economic rents, then resource conservation should be the overriding concern and payment for the Federal lease should be set at the flat-rate minimum. Such tracts will likely also be within the class of tracts where the administrative costs of detailed lease evaluation outweigh the expected incremental rent-capture benefits.

- The government should make idle speculation costly in order to put the coal into the hands of those who wish to develop it. One possible method is to require the lessee to post a sizeable bond when he obtains a lease. This bond would be redeemable if the lease is produced but would be lost if it is not produced. The flat-rate minimum bonus payment or reservation price will also tend to filter out idle speculators but the bond adds an additional degree of control and post-sale incentive to produce. The importance of making non-diligence costly to a potential lease purchaser is that in such a situation the government cannot be accused of overleasing, i.e., of dumping coal, or putting too much Federal coal into the hands of idle speculators. If the costs of non-development are significant, once the projected demand for contract coal can be met by Federal coal already under lease in a region, firms will simply stop bidding on new Federal coal tract offerings until the likelihood of being able to bring newly purchased leases into production within the time limit for diligence again becomes acceptably high.

Some rents may still exist in the system, even if regional supply is unrestricted. Recent air-quality and reclamation laws have increased the demand for low-sulfur, low-reclamation-cost coal. Where there is only a limited quantity of such coal within a region, it will tend to command a higher price than less desirable coal even if production costs are similar. Some other potential causes of rent differences across Federal tracts include transportation, Btu quality and access differentials. Even if such rents may exist, it is arguable whether detailed evaluations are warranted considering the limited potential quality of even the most carefully calculated rent estimates, the capture via

royalty payments of most of the total rents, the tendency of residual rents to become consumer surplus via lower f.o.b. prices because of cost-based pricing by producers contracting to utilities, the capture of approximately half of any excess profits via corporate income taxes, and the potential capture of residual rents via the individual Federal coal lease auctions. However, alternative non-evaluative methods of rent capture may be cost-effective. Among these are the following:

- 1) A profit-share contingency payment which would tax only profits above a reasonable return on investment could be made a term of new Federal coal leases. Such a system has been developed for OCS leasing and will be tested in the near future. A similar system for Federal coal leasing appears to be feasible, and could possibly be evolved in less time than the two years spent on developing the OCS system; however, the benefits of such a system are not as certain in coal as in oil and gas leasing when weighed against the additional complexity and administrative cost it would add to the Federal coal management system.
- 2) Federal coal could be combined with adjacent private coal and offered together for lease as a complete and viable logical production unit. This "presale unitization" could result in very high levels of competition for such lease units. However, if Federal coal could be offered in quantity sufficient to drive lease rents to near zero, then it would be hard to argue that presale unitization could be cost-effective in terms of its incremental rent-capture benefits. Also, by limiting

Federal coal lease sales to those tracts on which presale unitization can be arranged, some of the best Federal coal may continue to be withheld from the market resulting in higher f.o.b. prices than would otherwise obtain. Furthermore, if the rents in the system are quite low, then an unmodified sale in which only a single firm is presumably interested in any particular Federal coal tract is preferable from the standpoint of having a lower level of socially wasteful redundant bid preparation costs.

- 3) An intertract auction could be held. This would be accomplished by adding several tracts to the lease sale beyond that number which would have been offered otherwise, but limiting the total number of leases to be sold to the original number. Presumably, all of the tracts offered would be of approximately equal coal quality and production cost. Bidders must then compete to keep their most favored tracts within the set of tracts that will be leased. The major strengths of this approach are that it could, at least in theory, provide a bonus payment on each tract leased that is at least equal to the rent value of the marginal tract leased, and that it can provide a market signal as to whether or not a sufficient number of tracts were offered in any particular lease sale to drive all higher cost coal from the regional market. In other words, if the intertract bid level is above zero then the expected rent on the marginal Federal tract is above zero

and more Federal coal should be offered and leased. A potential problem with intertract bidding is that it may tend to slow the downward movement of the f.o.b. price towards a competitive equilibrium by capturing the transitional quasi-rents as bonus payments.* Also, it may favor those firms capable of paying large bonus payments over equally capable firms who are not as well-capitalized.** Intertract bidding does not appear to be essential to the establishment of a sound Federal coal lease-pricing policy; however, its further development appears to be warranted and practical intertract bidding sale procedures are currently being developed by an interagency task force in order to test the system's merits.

* However, this is true of any device utilized to capture the quasi-rent.

** This holds for any competitive bonus bid system when large quasi-rents may exist.

Notes for a Proposal for a Flat-rate Minimum Acceptable Bid (The Gordian knot solution)

Charles L. Towle

The Department should as a matter of policy abandon evaluation of bids on a lease by lease basis prior to each tract sale. Rather, the Department should adopt a standard-level minimum acceptable bid of 12.5% and \$25 per acre for surface mines and 8% and \$25 per acre for underground mines as it has already done in the case of lease readjustments. As a variant of the proposal, the Department could consider applying flat rates determined regionally rather than nation-wide. These would be lower in regions such as southern Appalachia and higher in regions such as Powder River. Comparable sales or DCF analysis would still be used from time to time to estimate impact on fair market value and economic rent.

The Department is very susceptible to an argument that with its present policies it is not capturing the economic rent of the resource at all, but rather riding on the coat tails of the OPEC price rises in energy. In an equilibrium state resource rents would be very small in the coal industry. Further 80% + of western coal is sold through long-term contracts, most with cost escalators. There is some validity to the assertion that the Department is causing impacts on consumers, which it would not be if it were capturing true resource rents. We have always accepted as fact the argument that the long-run supply curve for coal is very elastic and in fact have used this argument in support of unsuitability criteria. If we are not collecting true resource related rent, we are in fact contributing to national inefficiency and inflation. If this is the case, the minimum value legally possible should be collected.

Advantages

1. The Federal government would reduce a major cost in the present administration of the program. GS evaluation drilling and discounted cash flow analyses would no longer be required except for special cases BLM adjudication of sale costs would be greatly reduced.
2. The time to prepare for sale would be reduced by 2 to 3 months.
3. The risk of sale failure and its consequences for assuring an orderly supply of coal sufficient to meet coal targets and its costs would be greatly reduced. Costs associated with sale failures would be avoided.
4. A major source of dissension on the Federal coal management program within and without, the Department would be removed.
5. A number of difficult technical problems with discounted cash flow such as the "proper" level for the discount rate and how to apportion value to small interdependent tracts would be mooted.
6. Decision should be seen as a very positive move by the Administration to foster greater use of coal. Market penetration potential of western coal would be greatly enhanced.

7. Decision should be seen as a very positive move by the Administration to counter the rising cost of energy.
8. Lower entry costs could foster greater competition by encouraging smaller enterprises to enter Western coal production.
9. Selection of tracts with best resource (cheapest to mine) would be given greater rewards by allowing rent differentials among tracts rather than flattening them across all tracts in seeking rents for public. Tendency would be to lease the best coal first (the coal most beneficial to national economic efficiency and, possibly, least costly to the environment)
10. Reliance on very sensitive mine cost models and other computer models would no longer be necessary.

Disadvantages

1. Department would be challenged that it is no longer fulfilling requirement of the FCLAA that the Secretary receive fair market value for coal resource, but...
 - a) Fair market value is provided for through use of competitive bidding structure, which we would not abandon, and in which would take steps to enhance through use of intertract and encouragement of a secondary market in Federal leases.
 - b) We would continue to conduct comparable sales analyses on a broad regional basis. Analyses thus far show that even at the minimums proposed, the Department is exceeding FMV levels in most cases.
2. Department would be losing revenue it could collect for the public, but....
 - a) nearly half of any revenue we lose we would be regained through Federal taxes.
 - b) 50% of revenue now goes to states which compete to some extent with U.S. for rent and which:
 - i) have generally indicated an indifference to FMV policy or in some cases opposed aggressive FMV collection (feeling that while FMV brings some immediate revenue, the enhanced industrial activity that would result from removing it would, because of multiplier effects, result in the end in greater tax collections where they are needed in the state.)

ii) have shown an excellent ability to collect "excess profits" through their own taxing mechanisms, which have the added advantage of reflecting actual state policies toward rate of coal resource development.

iii) favor the more visible policy of direct energy impact aid.

3. Present resource owners would be losers if this decision were taken since the Federal government is the price leader for all Western coal.
4. Eastern coal operators would lose some additional business to Western coal mines.
5. Personnel dislocation, but — the Department needs 200 or more for coal program and also needs employees with management experience and abilities in mining and minerals, especially in coal. Evaluation would still be required for exchanges and PRLA tests.
6. Abrupt change in policy can cause political problems regardless of the merits of the change.

The Intertract Approach

Donald J. Bieniewicz
December 1979

Preliminary Steps

- The upper limit on the number of tracts to be sold is announced.
- The minimum acceptable bid is announced to be some fixed payment per acre, say \$25 - \$100, the same for all leases offered. The royalty rate is 12 1/2%.
- USGS estimates the conditional expected economic rent (CEER) of each lease based on the best possible estimate of the f.o.b. price which will result from the sale.

Option 1

- A sealed bonus bid auction is held.
- The bids are opened and the high bidder on each tract is determined.
- Tracts are ordered via the following proportion:
$$(\text{high bid}) \div (\text{USGS estimate of CEER})$$
- Tracts are accepted in the above order until the sale target is reached.

Option 2

- The USGS estimates of CEER are announced presale for information purposes.
- All bidders interested in a tract must identify themselves to the government prior to the sale.
- A stepped-price increase auction is held.
- Prices are increased in steps together for all tracts as an equal proportion of the tracts' estimated CEER.

- Gradually bidders will drop out until the number of tracts having interested bidders equals the sale target.
- If a tract still has more than a single firm interested in it, a separate oral auction for the tract can be held or the price could be stepped up for such tracts alone until only a single competitor remains.

PUBLIC DISCLOSURE OF
RESOURCE
MINING AND
ECONOMIC
DATA ON COAL TRACTS PRIOR TO LEASE SALE

Prepared for Fair Market Value Task Force

Office of Coal Leasing
Planning and Coordination
Department of the Interior

by

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November 1979

The issue of the desired level of public disclosure of resource, recovery, and economic data on coal tracts is readily subdivided into two groups.

1. Providing adequate coal resource and associated overburden, underburden, and interburden, hydrologic and related physical factors, both quantity and quality parameters plus basic elements of mining methods and production of coal. This would be the basis of the the firm's plan for development and production of coal including cost and revenues and to formulate a bid on the tracts of interest.
2. Provide resource, mining method, cost, and revenue factors, and the coal resource value of the tract itself.

In view of these alternatives, a review of the statutes of P.L. 94-377 show the following provisions.

"Sec. 2 x x x Prior to his determination of the fair market value of the coal subject to the lease, the Secretary shall give opportunity for and consideration to public comments on the fair market value. Nothing in this section shall be construed to require the Secretary to make public his judgment as to the fair market value of the coal to be leased, or the comments he receives thereon prior to the issuance of the lease x x x .

Sec. 3. x x x (C) x x x Prior to issuance of a lease, the Secretary shall evaluate and compare the effects of recovering coal by deep mining, by surface mining, and by any other method to determine which method or methods or sequence of methods achieves the maximum economic recovery of the coal within the proposed leasing tract. This evaluation and comparison by the Secretary shall be in writing but shall not prohibit the issuance of a lease; however, no mining operating plan shall be approved which is not found to achieve the maximum economic recovery of the coal within the tract. Public hearings in the area shall be held by the Secretary prior to the lease sale x x x .

Sec. 8A.(a) The Secretary is authorized and directed to conduct a comprehensive exploratory program designed to obtain sufficient data and information to evaluate the extent, location, and potential for developing the known recoverable coal resources within the coal lands subject to this Act. This program shall be designed to obtain the resource information necessary for determining whether commercial quantities of coal are present and the geographical extent of the coal fields and for estimating the amount of such coal which is recoverable by deep mining operations and the amount of such coal which is recoverable by surface mining operations in order to provide a basis for --

'(1) developing a comprehensive land use plan pursuant to section 2;

'(2) improving the information regarding the value of public resources and revenues which should be expected from leasing;

'(3) increasing competition among producers of coal, or products derived from the conversion of coal, by providing data and information to all potential bidders equally and equitably;

'(4) providing the public with information on the nature of the coal deposits and the associated stratum and the value of the public resources being offered for sale; and

'(5) providing the basis for the assessment of the amount of coal deposits in these lands subject to this Act under subparagraph (B) of section 2(a)(3) x x x .

(d) The Secretary shall make available to the public by appropriate means all data, information, maps, interpretations, and surveys which are obtained directly by the Department of the Interior or under a service contract x x x . The Secretary shall maintain a confidentiality of all proprietary data or information purchased from commercial sources while not under contract with the United States Government until after the areas involved have been leased x x x .

(f) The Secretary is directed to prepare, publish, and keep current a series of detailed geological, and geophysical maps of, and reports concerning, all coal lands to be offered for

leasing under this Act, based on data and information compiled pursuant to this section. Such maps and reports shall be prepared and revised at reasonable intervals beginning eighteen months after the date of enactment of this Act. Such maps and reports shall be prepared and revised at reasonable intervals beginning eighteen months, after the date of enactment of this Act. Such maps and reports shall be made available on a continuing basis to any person on request x x x .

- (h) x x x x to supply a statement of the results of test boring of core sampling including logs of the drill holes; the thickness of the coal seams found; an analysis of the chemical properties of such coal: and an analysis of the strata layers lying above all the seams of coal."

Thus the statutes specifically state that resource data and mining methods analysis are to be released to the public. There is reference to providing data as to the "value of the public resources being offered for sale."

The regulations as specified is 43 CFR 3400's - Coal Management contains the following paragraphs:

34221-1

"(a) Solicit public comment on the fair market value of the tract or tracts proposed to be offered. Such solicitation shall ask for comments on these items which affect the appraisal such as the terms and conditions of similar market transactions, the quality and extent of the coal resource, the price that the mined coal would bring in the market place, the cost of producing the coal, the interest rate at which anticipated income streams should be discounted, depreciation and other accounting factors, the value of the surface estate (if private surface), the mining method of methods which would achieve maximum economic recovery of the coal and any other items which might affect the appraisal of the tract or tracts. Such comments will be solicited for a period of not less than 30 days x x x .

3422.2 Notice of Sale x x x x

(2) Contain the pre-lease indication of maximum economic recovery by bed of coal to be mined as a guide to bidders, even though this determination would not be a lease term and would be subject to revision in the formal MER determinations to be made in mine plan approval x x x .

Therefore the regulations are not as specific as the statutes.

The issue of what coal tract data that exists and could be released/made available on tracts offered for lease sale is readily subdivided into 3 topics: resource (coal and other), mining, and economic; in addition, these can be input data or processed results. One end of the spectrum is to provide or allow interested parties the opportunity to obtain as much data on the coal resource including quantity and quality along the parameters of the associated over-inter and underburden, hydrologic and other data on physical features. The other end of the spectrum is to provide comprehensive reserve, mine design, cost, revenue, and a value assessment of the tract including the Government's estimate of minimum acceptable bid. Between these two polar approaches there are a number of intermediate solutions. For analysis purposes, comments are structured at these two levels.

The first approach is designed to provide the serious potential bidder with the data on coal resource and associated environment. Thus the firm could design an optimum mine, select equipment and necessary facilities, specify the costs and revenue elements applicable to the firm, and thereby develop a basis for bidding on the tracts in which it has an interest. This approach seems most applicable to leases, that would require the development of new mines and associated facilities, thereby, having a high competitive interest.

The second approach provides input data for all project phases and processed data on coal resource, mine design and costing through to and

including tract value. The cost and revenue parameters must be obtained from other sources and as such the costs that would be incurred by a company is subject to the specific details of product design, negotiating ability, and financial credibility of the potential buyer. In addition, in times of double digit inflation the changes in base level of the monetary factors changes significantly in a short time so the useful life of the cost data is limited. Accordingly, as one proceeds from the first approach to the second, the values provided are based to a greater extent on value judgements or factors that can change in a short period of time.

In this approach a potential bidder can enter the scene at any level of data development. However, if the bidder does not start with an assessment of the raw resource data, he will not have a complete understanding of the strength, and applicability of the available information. If these data are used by a firm, the Government may be held liable for effects or operations that are incurred because of reliance on the Government provided data. In addition, the Department would be into the business of providing economic evaluations of tracts and potential bidders may spend a considerable part of their effort factoring or second guessing the Government derived tract values instead of developing independent assessments of how to conduct their future operations. Because of the normal desire to minimize "money left on the table" by potential bidders this is incentive to minimize the size of bids if the threshold value (minimum acceptable bid) is known. Therefore, this approach may tend to encourage collusion.

This approach seems more applicable to small tracts where the offset operator and/or applicant has extensive knowledge of the coal resource, its feasibility of mining and probably has existing operations. Therefore he knows the basic factors and is probably most interested in obtaining the best personal bargaining position. Greater knowledge of the Government assessment of the value of the coal resource would tend to enhance the interested firm's ability to acquire the tract at lesser cost.

Accordingly, it seems appropriate to provide quality basic resource data so that the interested parties can prepare their best estimates of the coal resource value and thereby the bonus bid. The objective and acquisition and dissemination of data on resources and mine design are consistent with the expertise of the U.S. Geological Survey. By providing a reliable resource data and generalized mine plans the Government will tend to reduce uncertainty and thereby may enhance the profitability of the project and accordingly the Government revenue.

If it is deemed desirable to use the total data release approach the system employed by the U.S. Forest Service would provide some insight. In the proposed sale of timber cutting rights the U.S. Forest Service provides an estimate of recoverable timber, a detailed list of applicable costs, and the minimum acceptable bid. These data are made available publicly and provide a basis for the potential purchasers to develop their bids. However, as a condition of acquiring a lease the stipulations provide that the lessees submit to the Forest Service a comprehensive operating cost statement for each tract acquired.

Accordingly, the costs used in a lease sale are derived from the operators in the area of interest. This insures costs applicable to the area but the operators must release data of the type that coal operators in the past have been reluctant to make available to the Department.

In summary, two approaches are provided for release of coal release data:

- (1) Maximum coal and associated resource data with a generalized mining method description.
- (2) Total resource, mining method, and economic analysis.

The first approach is well adapted to tracts requiring new mines which have significant competitive interest. The second approach seems more applicable to small tracts with interest only to the offset operator who may desire to enhance his bargaining position and acquire the tract of interest at the lowest price.

PROCEDURES
FOR
EVALUATING SMALL TRACTS

Prepared for
FAIR MARKET VALUE TASK FORCE
Office of Coal Leasing
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PROCEDURES FOR EVALUATING SMALL TRACTS

SMALL TRACT ISSUE DEFINITION

Ownership Patterns and Lease Status

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Transaction and Uncertainty Costs for Small Tracts

REFERENCES AND GENERAL SOURCES

PROCEDURES FOR EVALUATING SMALL TRACTS

The issue of evaluating small tracts of coal lands to determine coal resource economic value input to fair market value is grouped into three headings:

- o Small tract issue definition.
- o Historical and legal perspective.
- o Alternatives.

These headings are discussed sequentially.

SMALL TRACT ISSUE DEFINITION

The issues of determining the value of a small tract, as compared to that of a tract large enough so that when developed it would allow economies of scale, are as follows:

- o The variation in unit values of the resources of small tracts vs. similar variations for larger tracts are inversely proportional to the relative sizes of the tracts.
- o Administrative costs of acquisition to the applicant or the firm tend to be independent of the size of the tract, thereby reducing the unit resource value of the smaller tracts.
- o The aspects of coal occurrence and quality, together with mining and extraction technology, are the same as for large competitive tracts. Sometimes the difficulties of evaluating small tracts have been caused in part by the lack of timely leasing and therefore opportunity for orderly development. Therefore, it seems appropriate to look at these issues from the perspective of: (1) ownership patterns and lease status and (2) economic evaluation.

Ownership Patterns and Lease Status

The economic value of Federal coal tracts is affected by the surface ownership status, the area and shape of the contiguous Federal coal ownership, and the non-federal mineral ownership status of the adjacent lands.

Following the Secretary's statement of policy concerning leasing where the surface over Federal coal land is not federally owned, the value of areas with all Federal ownership has increased. Such areas of all Federal ownership which are contiguous and contain a 40-year supply of coal reserves would have a high value. The lesser value would be associated with small acreages of Federal surface and coal containing small reserves and surrounded by non-Federally owned coal or Federal coal with non-Federal surface. The latter areas would have little market value until interest in development of the surrounding non-Federal coal was shown.

Economic Evaluation

Tracts are evaluated using either the comparable sales or the discounted cash flow method (DCF). Rigorous assessment of the evaluation methods indicates that tract size may be a consideration in assessing coal unit values as discussed by Geehan.⁶

"The general approach in a DCF procedure is to first estimate the capital investment costs, operating costs, depreciation, depletion allowances, and income taxes that would be incurred in the development of the property in question. These items then are the bases for a series of projected annual cash flows, where cash flow is defined as gross revenue minus out-of-pocket expenditures minus taxes. Each year's cash flow is then discounted back to the present time at a rate that approximates the industry's cost of capital. (This discounting reflects the time value of money, i.e., the fact that a dollar received one year from now is worth less than a dollar received now.) The summation of these discounted cash flows is called net present value, and is equivalent to a FMV estimate.

Any DCF analysis is relatively sensitive to the estimates of cost of capital equipment and the cost of operating that equipment. These items are functions of the scale of operations (annual production) which is assigned to the mineral deposit. It is generally true that economies of scale, i.e. lower average total cost per unit of output, can be achieved by increasing the scale of operation. On the other hand, there must be adequate mineral reserves to support these larger scales of operation. The principle of economies of scale has a special significance because tracts can be viewed as either part of a large mining unit with relatively low average total costs or as a unit in itself with higher costs. Given the sensitivity of the income approach to costs, some guidance is necessary regarding the selection of scale."

For the firms, there must be consideration of the availability of capital, alternative investment opportunities, the present value of future earnings, rates of return, and need for coal in downstream facilities, and so on. For the Government, the appraisal of what is an optimum value hinges on the various public revenues that may be derived, returns from publicly owned lands, regional and national social and economic impacts, national economic security, and environmental protection. Accordingly, it may be difficult for both the company (the buyer) and Government (the seller) to arrive at a single approach which not only balances all of these considerations, but also copes with the uncertainties of future prices and costs, the quantity of ultimate reserves, and the balancing capital investment against rate of recovery.

The actions of sellers and of purchasers can be modeled using various approaches. While classical economic models provide some insight into potential results, the situation of small tracts of one seller and one potential purchaser can be visualized using the bilateral monopoly model as depicted by Bilas² and by Braff³. This model depicts separate optimum decision points for seller and buyer and there is not a rigorous solution. An intermediate point between the individual choices may represent the basis for a negotiated optimum solution.

HISTORICAL AND LEGAL PERSPECTIVE

The history of economic evaluations of mineral resources is based in part on laws that have been formulated for mineral properties. Accordingly, since we are concerned with coal, it seems appropriate to review these laws in view of: (1) fair market value, (2) surface ownership, (3) mineral ownership, (4) oil and gas lease pooling, (5) solid mineral lease aggregation, (6) coal leasing, and (7) transaction and uncertainty costs of small tract values.

These observations are later brought to bear on coal tracts regarding aggregation and disaggregation of tracts for small tract value purposes.

Fair Market Value

Geehan⁶ comments on this subject as follows:

"According to the Federal Coal Leasing Amendments Act of 1976 (P.L. 94-377, 90 stat. 1083) the Secretary of the Interior is authorized to offer coal for leasing by competitive bidding, where no bid will be accepted which is less than fair market value (FMV).

Fair market value has been defined as

'the amount in cash, or on terms reasonably equivalent to cash, for which in all probability the property would be sold by a knowledgeable owner willing but not obligated to sell to a knowledgeable purchaser who desired but is not obligated to buy.'

(Uniform Appraisal Standards for Federal Land Acquisitions, p. 3, 1973)"

There are four general methods for estimating FMV:

- o Prior sales of the identical property.
- o Replacement cost.
- o Comparable sales.
- o Income approach.

Prior sales of the identical property normally do not exist, and the replacement cost approach is not realistically applicable to the mineral estate. Some comparable sales data may not be readily convertible to FMV. Therefore, the income approach to FMV, utilizing discounted cash flow (DCF) procedures is the method most used.

Geehan⁶ further states

"The concept of FMV has its roots in condemnation actions taken by the Federal government under the authority of the Fifth Amendment of the Constitution. In a case often cited in appraisal practice, Justice Roberts, in delivering the majority opinion in U.S. v. Miller (317 US 369), stated:

"Again strict adherence to the criterion of market value may involve inclusion of elements which, though they affect such value, must in fairness be eliminated in a condemnation case, as where the formula is attempted to be applied as between an owner who may not want to part with his land because of its special adaptability to his own use, and a taker who needs the land because of its peculiar fitness for the taker's purposes. These elements must be disregarded by the fact finding body in arriving at fair market value.

Since the owner is to receive no more than indemnity for his loss, his award cannot be enhanced by any gain to the taker. Thus, although the market value of the property is to be fixed with due consideration of its available uses, its special value to the condemner as distinguished from others who may or may not possess the power to condemn, must be excluded as an element of market value.

(317 US 375) (footnotes omitted)

Recognizing that FMV is not influenced by the position of the estimator, i.e., whether he represents the buyer (condemner) or seller (condemned), the Court's decision is instructive to the question of selection of scale. An estimate of FMV should not consider unique values of the property to an adjoining property owner."

As defined in The Uniform Appraisal Standards for Federal Land Acquisition:⁷

"Highest and best use: The determination of the fair market value should include consideration of the highest and best use for which the property is clearly adapted. By highest and best use is meant either some existing use on the date of taking, or one which the evidence shows was so reasonably likely in the near future that the availability of the property for that use would have affected its market price on the date of taking and would have been taken into account by a purchaser under fair market conditions. . . . In no event should the appraisal be made by the evaluation of the property for one use, and the addition to that amount of the value for a different and inconsistent use. And as spelled out in more detail under the heading

'Conjectural and speculative evidence'. . . remote or speculative uses should not be considered. Normally, because of existing economic pressures, the existing use represents the highest and best use.

Because the highest and best use is a most important consideration, it must be dealt with specifically in appraisal reports. Many things must be considered in determining the highest and best use of the property including: supply and demand; competitive properties; use conformity; size of the land and possible economic type and size of structures or improvements which may be placed thereon; zoning; building restrictions; neighborhood or vicinity trends."

Surface Ownership

Real property (surface) transactions consider the value of tracts as they are owned; i.e., they must stand alone. The value that can be achieved as a result of combining more than one tract is not a consideration. The result is, of course, that the sum of the parts may not equal the value of the combined group as these values are achieved on a different basis.

Surface ownership during ownership of one party is not inferred to change in value, rather change in value is normally reflected when the property is disposed of. Accordingly, the issue of aggregation of parcels of which several may be used collectively is of limited concern. However, when the lands are subsequently disposed of, the net gains realized are attributable to the lands in proportion to the acreage and cost of the original transactions.

Mineral Ownership

Mineral leases, which are a form of real property, have several unique aspects such as:

- o Their maximum duration is normally related to the stage of depletion of the mineral deposit being leased or to a fixed time limit.
- o They continue subject to the above by the lessee meeting certain financial or development obligations.
- o The revenue derived from sale of the leased mineral is divided between between the lessor (original owner) and the lessee (or developer). Accordingly, this is a special form of a "partnership" in that one party, the lessor, provides the mineral resource and the other party, the lessee, the capital and management to develop, produce, and market the leased mineral commodity.

The income tax laws and financial accounting practices recognize the real property aspect of mineral deposits. In addition, since the quantity of the deposit is reduced in quantity as it is recovered (depleted) the tax and financial procedures recognize that the value of the property is lessened. Accordingly, the costs of exploring for, developing, and producing mineral deposits are allocated to the quantity of resource in the deposit of interest and as the deposit is produced and marketed these costs are similarly apportioned. Accordingly, the basic unit for operational accounting practice is the deposit which is analogous to an industrial plant composed of several units.

Aggregation of mining properties is discussed by Morgan⁹.

"The joining together of miners owning separate claims covering the same lode for purpose of a single mining operation is not new, but occurred in the early days of mining. Lindley, in his work, stated:

Long before patents were allowed, indeed from the earliest period in which mining for gold and silver was pursued as a business, miners were in the habit of consolidating mining claims, whether they consisted of one or more original locations, into one, for convenience and economy in working them. *

Such consolidation generally occurred for purpose of working a single lode or vein. Even today where the formation to be mined underlies a general area, as often occurs in uranium bearing formations; or, in those cases where one shaft and a single mining operation may adequately serve additional claims or properties and the owners may thereby reduce their respective economic outlay; it appears feasible and practical to consolidate operations. By the same reasoning, joining together properties for operations which may involve several non-contiguous and non-associated properties and may be greater in scope than what might be designated as a single mining operation; (i.e. operation of one mine or one vein,) appears have some feasibility and may in some situations be desirable. This is particularly true where several operators desire to join their mining properties and dedicate the ores to a mill in which all shall share in the benefits of lower milling costs obtainable by a large single milling operation. Also, there is a possibility of tax benefits by way of depletion.

Joint operation is certainly worthy of consideration in a situation where discovery of ore-bearing formations has been made in remote areas and, where the ore bodies in the same area are made on separately owned claims, whether contiguous or not contiguous. Joint operation is particularly appealing in such cases where the respective ore bodies vary in total estimated reserves and in grade and character. The owners of the ore bodies of lesser value may not be justified in mining them if the ore cannot be upgraded or blended with higher grade production. Mining costs play an important part in an operator's determination of the feasibility of mining. Thus, in some cases an operator is faced with consolidating his property with others which would reasonably ensure an economic profit, or of selling the properties outright for a lesser gain than he wishes, or of deferring mining to some future date."

* 2 Lindley, Mines, 630 (1914 3rd ed).

Oil and Gas Lease Pooling

The irregular distribution of oil and gas reservoirs, their great variation in areal extent, quantity, and feasibility of extraction, and the inherent mobility of these fluids to migrate across property lines have produced a mass of ownership laws, tax regulations and accounting practices to encourage development, optimize production, reduce waste, and achieve equity among those parties with an economic interest in a reservoir (deposit). State laws and Federal regulations recognize the need to aggregate properties in a reservoir or portion thereof to optimize recovery and reduce waste.

In the development stage, tracts which by themselves are not economical to develop are pooled into an accepted pattern of development, either voluntarily or, normally, by the State oil and gas regulatory agency. Subsequently, the whole or a portion of a field may be operated as an entity (unit), although there may be more than one mineral owner (lessor) and/or lessee.

In each case Federal Income tax laws require that each separate property unit be treated as such. Because of this, and for equity reasons, it is necessary to allocate revenues and costs to the various tracts that comprise the pooled unit or recovery unit in proportion to their contribution to the unit. The basis of unitization for second recovery (therefore basis of allocating costs and revenues) is discussed by Landis,⁸ who outlined 12 types of maps and factors to be considered. The practice in Louisiana is described along with a manner of allocating participation costs is presented by the Regulatory Practices Committee¹².

"The State of Louisiana through its Department of Conservation employs a system which enables the owner of a drilling unit on the edge of a pool to obtain his fair and equitable share of the oil and gas in the pool without unnecessary cost or the drilling of unnecessary wells. Upon application, notice and hearing, the Department determines the amount of productive acreage in the edge spacing unit, then adds this acreage to the adjoining spacing unit which is presumably already producing. The owners of the edge tract are permitted to share in the cost of the well on the adjoining tract in the proportion of the number of productive acres in the edge tract to the number of acres in the consolidated tract; the producing unit is enlarged by adding such adjoining productive acreage with an appropriate allowable adjustment.

Determining Cost to Participate

The owner of the working interest in the newly added acreage is required to pay his share of the cost of the well on the enlarged production unit. If that well has been producing for some time, it is the practice to allow the new owner to pay on the basis of the depreciated total cost of the well, and the depreciation is based on the remaining percent of expected ultimate recovery of such well. Because the tangible equipment in a well, casing, tubing, surface equipment, pumping unit, tanks, etc., do depreciate at a different rate, another method of admitting a new owner would be for him to pay for the intangible costs, drilling, trucking, labor, etc., on the basis of depreciated expected ultimate recovery, and for the tangible costs on the basis of market value at the time of adjustment."

Unitization and allocation are discussed by Williams¹⁶.

"Because of the lack of experience in mining with unitization and because of the similarity in this area of mining to oil and gas production, an examination of approaches which have been taken in the oil industry might prove useful.

1. Allocation of Production

The most difficult problem to solve in the formation of an oil and gas unit where a large number of mineral owners are involved is the formula to be used in allocating the production of minerals from the unitized area. It is here that the decision to unitize is often rejected. The ideal which the drafter of such a formula should attempt to achieve is that each participant in the unit be given that amount of unit production which is in exact proportion to the contribution which he makes to the unit. However, with human nature being what it is, each participant tends to overstate his contribution and the formula will probably result from the give and take of compromise.

a. Surface Acre Formula

A common method for allocating production in the oil industry has been to allocate that amount of production to each participant which bears the same ratio to total production from the unit area as the number of surface acres contributed by the participant bears to the total surface acres contained in the unit area. This method is particularly appropriate when the allocation is being made prior to the exploration of the lands within the subject unit area, and, therefore, prior to any specific knowledge as to ore deposits in the subject lands.

b. Recoverable Reserves Formula

When the property has been sufficiently explored or developed to allow for the estimate of recoverable reserves, the formula is usually drawn in the oil industry using this as its basis. In this instance, the participant receives that amount of production which bears the same ratio to total production as the estimated total recoverable reserves (or in some cases, the total estimated acre feet of producing sand) contributed by the participant to the unit bears to the total contained in the unit. In mining operations, this approach would be practical after close space drilling had been completed.

In some large units, the determination of this ratio is often left to be accomplished after exploration has occurred. In addition, it sometimes varies within designated participating areas within a unit."

Solid Mineral Lease Aggregation

The 1872 Mining Act provided for issuance of title to limited size parcels for the mineral and surface rights on mineral deposits on proof of an adequate exploration program

and discovery of a mineral or minerals. Accordingly, the total mineral interest was conveyed to the applicant. Therefore, the Federal government's monetary interest in these parcels is limited to the income tax revenue. For tax and for financial reporting purposes, the parcels with a single owner containing a part or all of a deposit are included in a property unit. For example, there is no allocation to those parcels that comprise the unit except possibly for some mineral interests that may have a limited royalty (overriding a royalty) interest. Accordingly, original mineral ownership is of limited importance. With the passage of the 1920 Mineral Leasing Act whereby coal and bedded minerals were leased, the aspect of the Federal lessor entered into the picture. However, the principle of aggregation of parcels to form an extraction unit for operational, tax, and financial reporting purposes is recognized, provided the royalty and/or overriding royalty considerations are accomplished. In addition, these mineral properties may be jointly owned or subleased from an earlier owner so that the aspect of the lessor/lessee relationship exists. Accordingly, there is a wide variety of mineral properties that are aggregated largely on a deposit basis to form an operational unit. The revenues and costs may be held aggregated or, depending on the form of the economic interest, lessee, (royalty, overriding royalty) or other interest have revenues and costs allocated to their interests.

A summary of pooling or unitization prepared by Mr. Morgan⁹ modified to fit coal is presented. Words in parentheses indicate substituted words.

" . . . a brief presentation of some of the more important provisions contained in oil and gas joint and unit operating agreements, and a consideration of consolidation and unitization of mining properties utilizing such bases of operation. Such operation for (coal) mining properties appears to be practical and feasible as means of conservation of equipment, facilities and management. In some cases, consolidation with other properties would permit the mining of [an ore body] (a coal bed) which would not be commercial if mined separately. Unitization of all interests in mining properties presents a means whereby a greater return would be realized by the parties through savings in operation and management costs and in the sharing in all production from the unit.

Some of the more important provisions suggested to be included in an operating agreement for a consolidated or unitized mining property are:

1. The method of determining participation in production based on the number of acres contributed, the number of claims, the quality and quantity of [ores] (coal), value, mineability, and the pertinent factors relating to establishing a fair, equitable and reasonable percentage in which each party will share. However, where a consolidation is effected prior to discovery of [ores and minerals] (coal), consideration should be given to participation with respect to the acreage contributed and perhaps the cost of exploratory work to be performed on each property. The formula should be stated in clear terms so as to leave little chance for different interpretation by the parties.
2. The method of determining the percentage of costs and expense each party will bear and pay.
3. The rate at which operator is to perform mining on the respective properties contributed should be established, if applicable. This may in some cases be an important factor where a leased property contributed is required to be mined at a specified rate under the lease.
4. Operator may wish to have a call on the [ores] (coal) produced, particularly where operator is the owner of [an ore processing mill] (a power plant), for the purpose of insuring adequate [mill feed] (fuel supplies)."

Williams¹⁶ discusses compulsory mining unitization in New Mexico

Compulsory unitization in the mining industry is found only in New Mexico where in 1967 the legislature there passed an act entitled "Consolidation of Small Tracts for Mineral Development."¹⁰

¹⁰N.M. Stat. Ann. 63-32-1 et seq. (1960)

This law came about through an interesting set of circumstances involving a uranium-rich section of New Mexico land. An enterprising lady real estate developer in 1933 subdivided the section into 640 one-acre tracts. During the course of her sales campaign, the section was further subdivided into smaller tracts, some being as small as 1/16th of an acre. The subdivision ultimately resulted in 2083 separate and distinct tracts being created within the section. . . .

. . . this operator was able to obtain mining rights covering in excess of 85% of the entire mineral estate in the Section.

It was at this point after several years of effort to obtain the mineral interest in the Section that the concept of compulsory unitization of the Section was developed. In 1968, under the new consolidation law, the Section was consolidated by order of the state district court and as to each tract on which the operator did not otherwise own the mining rights, a mining lease was effectuated to the operator. The terms of the lease are set out in detail in the decree.^b

The statute under which this consolidation order was obtained is patterned somewhat after the compulsory unitization statutes pertaining to oil and gas

Its first section is a declaration of policy:

It is hereby declared to be in the public interest to provide a method whereby small tracts of land, which cannot economically be separately explored and mined, may be consolidated for the purposes of exploring, mining and conserving the natural resources of this state under those circumstances where the mineral development of such tracts and the recovery and conservation of the natural resources of this state therein contained cannot otherwise be practically accomplished."

^b
There is no published report of this case. The order was issued by the District Court for McKinley County, New Mexico on April 15, 1968 under Docket No. 12801.

Coal Leasing

The current Federal coal leasing program is entering a scenario that has seen a moratorium on leasing followed by court imposed sanction that allowed leasing only to keep mines operational. In addition, the coal industry has been rapidly expanding following an extended period of low activity.

Looking to the future, the thrust of the coal program is to lease large tracts so as to encourage good mining practices, reclamation and community planning, to achieve optimum coal recovery, and obtain fair market value of the coal resource. Accordingly, in tract delineation, selection and ranking the logical mining unit (LMU) concept is used.

These procedures are consistent with the intent of the Federal Coal Leasing Amendment Act of 1976 which requires:

- o Assessment of mining method or methods.
- o Achieving maximum economic recovery (MER).
- o Obtaining fair market value. (FMV)

The former leasing process was based on the applicant's request for particular lands. These applications commonly specified quantity, quality, location, the time coal resources were to be made available, in the manner that would best serve the applicant's need. By such action, these tracts, became "isolated tracts". This approach was not necessarily based on the overall consideration of the Federal coal lands in the area of interest. There are, in some cases, small tracts of Federal coal which are located a significant distance from other lands.

Timely recommendations for leasing, steps to acquire the necessary data, and make evaluation of the coal resource help insure that unleased Federal coal is not bypassed. Distress sales of bypassed coal are a function of untimely marketing, not intrinsic coal resource economic value.

The Geological Survey evaluation model depicts orderly mining operations and rate of extraction as discussed by Pederson.¹¹ The model simulates action to take place on specific lands at a particular time. All lands in the area of operation must be considered. This concept of pooling lands, operations, and mineral interest, has long been embodied in oil and gas extraction. Accordingly, it seems appropriate for Federal coal, and is conceptually embodied in (LMU).⁹

A problem which has arisen in past government estimates of minimum acceptable bids for small tracts is whether the estimate should be based on the tract's value in the general market place or on its value to the bidder in the superior position. The former criterion is equivalent to capture of the FMV, while the latter is equivalent to capture of economic rent.

These criteria can have extreme ranges.⁴ For example, the income (DCF) approach to value applied to a small Federal tract recently offered for lease in Montana indicated no value when applied to the tract alone, but a value of almost \$4,000 per acre when the small tract was evaluated as part of a mining unit including adjoining coal (both cases assume the minimum royalty of 12.5 percent).

The established principles of FMV require that estimates be based on the value of the subject property in exchange in the open market. By evaluating small tracts as part of a logical mining unit encompassing adjoining coal, it can be argued that the government has been estimating the tract's value in use to the anticipated superior bidder.

A review of these issues and the basis of evaluation indicates there are ways of assessing them.

Accordingly, the LMU concept in form of a viable economic mining unit (VEMU) is recommended as the appropriate vehicle for determination of coal resource economic value. The approach of grouped tracts which best represents how the tracts will be mined would appear to be the best use of the lands, and it is consistent with the fair market value criterion.

Efforts to enhance the formation of VEMU may include stipulations on future leases to require pooling of lands into a logical mining unit even if there are more than one lessee. However, the issue of coal market availability to the potential lessee(s) warrants further review. Pooling lands would allow the management agency latitude to respond to timely requests for leasing under small tract procedures and an opportunity to lease tracts at their discretion regarding size and timing. This evaluation procedure could also ascertain the economic value of lands that may be acquired in exchanges and in the lease modification procedure.

The leasing regulations require that tracts be designated for Small Business lease sales and for mining licenses. During the tract delineation phase, tracts amenable to the requests of small business would tend to be smaller than the standard competitive lease sales tracts and some smaller tracts could be evaluated on stand-alone basis.

In addition the depicting of small tracts as being noneconomic introduces several issues or consequences as follows:

- o Highest and best value needs to be demonstrated,
- o Economic recovery of coal needs to be substantiated.
- o Many selected lands for exchanges would have no value.
- o Lands designated as unclaimed-undeveloped in Preference Right Lease Applications would seldom have value.
- o Lease modification value would be minimal.

If tracts are handled on a stand-alone basis (especially, if the coal resources are inadequate to support an economic mining operation), it would appear that this is not the highest and best use either for the fair market value or the Department's land use planning screen.

If each tract of a group is considered independently and the reserves are determined, the factors of the lease offset, slope considerations and other aspects will materially reduce the calculated recoverable quantity of each below that which would be obtained if these tracts were assessed as a group.

Small parcels offered for land exchanges would be assigned nominal values, as would the mining land claims designated within PRLA's, because of their limited size would probably not support a separate mining operation and thus be deemed nominal. Similarly, lease modifications would normally have no bonus value and, if deemed economic, would have only basic royalty.

Transaction and Uncertainty Costs of Small Tract Values

Attempts to combine several parcels or tracts into a unit for development and production of coal must consider two elements. The administrative costs of acquiring a tract of land offered for lease will tend to be related more to the number of tracts than to the costs per acre or ton of coal.

Statistical tests of subdivision of a population into smaller and smaller groups show that as the groups get smaller, and more numerous, the range of unit values (\$/ton) tends to increase. Therefore, to reduce risk and by being assured of an economically feasible tract the buyer tends to bid less than the VEMU average. Thus, the unit value of small tracts tends to be lesser because of transaction cost and small tract value uncertainties.

ALTERNATIVES

Alternatives in the form of a "position decision option document" are presented on the five factors of interest: (1) basis of aggregating lands; (2) capital and operating cost vintage; (3) coal price vintage; (4) disaggregation of model coal resource economic value to tract of interest, and; (5) transaction and uncertainty costs for small tracts.

Issue

The extent of lands and quantity of coal resources to be included when modeling coal resource economic value determinations needs to be structured. Any DCF analysis is relatively sensitive to the estimates of cost of capital equipment and the cost of operating that equipment. These estimates are functions of the scale of operations (annual production) which is assigned to the mineral deposit. It is generally true that economies of scale (i.e., lower average total cost per unit of output) can be achieved by increasing the scale of operation. On the other hand, there must be adequate mineral reserves to support these larger scales of operation. The principle of economies of scale has a special significance because a tract can be viewed as either part of a large mining unit with relatively low average total costs or as a unit in itself with higher costs. Given the sensitivity of the income approach to costs, some guidance is necessary regarding the selection of scale (i.e., is the tract of interest to stand alone and bear all capital and operating costs for a mine on that tract or is the tract to be considered a part of a VEMU?).

Alternatives

A. Tract of interest only.

Pro

- * Relates only to coal resource being evaluated.
- * Legally defensible.
- * Presents evaluation based on independent assessment of coal resource.

Con

- * Does not necessarily relate to how coal would be produced in actual mining conditions.
- * Simplifies method of tract evaluation but MER may be difficult to define.

B. Tract of interest plus land under control of applicant or industry nomination.

Pro

- * Model of a real world situation as to mining method and recovery.
- * Evaluation model and MER compatible.
- * Tends to show a higher CREV.
- * Regulations provide the approach in LMU's.

Con

- * If applicant has no lands or limited amount of lands, value may be negative because of high capital costs.
- * Does not typify a competitive situation.

C. Tract of interest plus sufficient unleased land to form a VEMU.

Pro

- * Allows for an adequate quantity of coal resource to allocate capital and operating costs.
- * Maximizes CREV.

Con

- * Basis of choice of coal resource may not be defensible.
- * Does not necessarily reflect real world situation.

Issue

When determining the CREV, especially when using the VEMU and coal lands are being evaluated for potential addition to existing operations, the value of facilities and equipment must be defined. When the LMU has been designed, the current practice is to base investment costs in the DCF on prices of new equipment and to base revenues on current market conditions. An alternative which would more closely approximate the superior bidder's situation would be to base investment costs on the replacement costs of the remaining depreciable life of equipment in use and to base revenues on the coal prices actually being received by the superior bidder. Evaluating equipment at replacement costs would overcome the problems of under-counting depreciation. Assuming that depreciation represents recapture of original investment for future reinvestment, under conditions of inflation, depreciation based on original equipment costs does not allow for recapture of replacement costs.

Alternatives

A. Assume capital costs for equipment designed for the existing operations and only the marginal costs or the operating costs applicable to tract of interest.

Pro

- * Real-life situation.
- * High CREV value.

Con

- * Benefits and costs not matched.
- * CREV may be so high as to preclude any leasing.

B. Assume equipment designed for the existing operation and include ownership costs of capital equipment items valued on a used or depreciated basis.

Pro

- * Very real-life situation.
- * High CREV value.

Con

- * Difficult to assess value of used facilities.
- * Penalizes operator who made good decisions in acquiring equipment.
- * Not representative of a competitive model.

C. New equipment and facilities for tract of interest only.

Pro

- * Representative of idealized competitive situation values.
- * Value compatible with the issuance of lease referenced when evaluation made.
- * Very ideal for competitive tract.

Con

- * Very unreal situation as to equipment choice.
- * Capital costs are prohibitive if applied to an emergency tract.

D. Equipment and facilities of the type used in the area priced at the current value and using current operating costs.

Pro

- * Reasonable representative of a competitive situation.
- * MER evaluation model and real life represented by a common approach.
- * Allows for independent cost determinations.

Con

- * Not totally representative of an ongoing operation.
- * There may not be operations on lease(s) adjacent to competitive tract.

Issue

Vintaging of coal prices results largely from inflation. However, the manner and level of escalating the prices varies between regions and from contract to contract on a single mine. Therefore, the price vintage, especially when applied to small tracts, becomes critical largely because previously negotiated contracts tend to be lower than contracts being currently negotiated. Also, in addition to the long term contract, there is the spot market value which oscillates with short-term market variations such as strikes and economic activity. Therefore, does the Government use the applicant's price, thereby giving the Government a share in the good or poor contract negotiating capability of the potential lessee, or does the Government consider a broader base of prices?

Alternatives

A. Price received by applicant or industry nominees for coal produced from existing operations.

Pro

* Representative of real world of the applicant for hardship applications.

Con

* Does not represent competitive situation.

* Data may be difficult to obtain.

* Government subsidizes operators low-coal-value contracts previously negotiated.

B. Price to be received by an applicant or a nominee based on contracts for coal in the area.

Pro

* Represents a real-world situation.

Con

* If contract previously negotiated, Government may be subsidizing operator's low-selling-price contract.

* Data may be difficult to obtain.

* Does not represent competitive situation.

C. Independently derived prices for area based on survey and technical analysis of data.

Pro

* Independently derived value.

* Representative of currently negotiated prices.

Con

* Data not necessarily representative of prices at which coal may be sold.

* Data may be difficult to obtain.

Disaggregation of Model Coal Resource Economic Value to Tract of Interest

Issue

The issue of disaggregating VEMU values to the tract of interest must consider coal resource quantity and value, mining capital and operating costs, areal extent, and timing of recovery. Procedures for incorporating the timing factor of when the tract of interest is mined are of interest. Other considerations to disaggregating would be the most common practice of using coal resource quantity. However, the cost of mining is an important consideration and accordingly should be included; physical parameters, which are the basis of costs, are appropriate for this approach.

Alternatives

A. Total coal resources present.

Pro

- * Includes all coal.
- * Encourages maximum economic recovery.
- * Readily quantifiable.

Con

- * With varying coal bed thickness, it is a poor measure of reserves.
- * With varying quality, it is a poor measure of value.

B. Recoverable coal reserves.

Pro

- * Relates to coal which is commodity being leased; has a good legal basis.
- * Readily quantifiable.

Con

- * Incomplete measure of total value of coal to lessor.
- * Does not incorporate coal quantity or mining cost.
- * Does not incorporate timing of recovery.

C. Depth and/or thickness of overburden.

Pro

* Readily quantifiable.

* Basis for the major cost components of a mine.

Con

* Does not relate to commodity leased or source of revenue.

* Quality variations which may be present are not considered.

* Value of tract, especially underground mined coal, may be only slightly dependent.

D. Surface area of unmined coal.

Pro

* Relates to all coal to be recovered.

* Readily quantifiable.

Con

* Does not reflect value of coal if beds vary in thickness.

* Does not usually reflect mining costs.

E. Consider timing and economy of recovery of coal.

Pro

* Measures contribution of tract of interest to income stream.

* Fairly quantifiable.

Con

* Subject to judgment as to timing.

* Varying choice of depreciation and depletion schedule can significantly vary results.

with many reserves.

* Extensive work requirements.

F. Combination of coal resources, coal reserves, and physical parameters, such as areal extent and depth burial for a underground mine, and/or quantity of overburden for surface mining.

Pro

- * Relates major physical factors of coal mining.
- * No judgment factors.
- * Generally applicable.
- * Readily quantifiable.

Con

- * Does not reflect timing of coal recovery.
- * Does not directly reflect economic factors.

Transaction and Uncertainty Costs for Small Tracts

Issue

Assessment of transactions costs and uncertainty of small tract values are factors which are analogous to formation and disaggregation of a VEMU but whose costs (or values) are not internalized.

By definition, transactions costs are a function of each transaction, therefore, the total transactions costs increase with the number of tracts. Conversely, the total transactions costs are inversely related to tract size. Similarly, the range of values of small tracts within a VEMU increases with the number of tracts and inversely with the size of tracts.

Alternatives:

A. Consider tracts as subsets of the VEMU and not make provision for transactions costs and uncertainties of value.

Pro

- * Sum of parts equal to the whole VEMU.
- * Readily quantifiable.

Con

- * Does not reflect all the firm's costs.
- * Does not reflect the reduction in values of small tracts owing to their unique uncertainties.

B. Consider small tract transactions costs.

Pro

- * Reflects firm's cost of acquiring tracts exclusive of the tract bonus or mineral cost.

Con

* Costs vary considerably and may be difficult to quantify on a tract-by-tract basis.

C. Consider small tract uncertainty costs.

Pro

* There is uncertainty as to the value of a particular tract, although collectively the values are all right.

* This variation in value is substantiated using statistical approaches.

Con

* The concept that uncertainty reduces value is a judgment factor (i.e., utility function).

* Difficult to quantify.

A series of options for assessing the aggregation coal and for disaggregation of coal lands to form a VEMU are presented along with cost and price vintaging, and factors applicable to small tracts.

The appropriate economic measures would be allocated to lands of interest in proportion to their contribution to the economic unit being modeled. This allocation would be such that the sum of the parts would be equal to the total value prior to allocation or include other costs to reflect the issues of small tracts.

The issue of coal being bypassed by mining operations is, in many instances, a lack of awareness of field operations and/or appropriate action to timely lease the coal.

The existence of isolated tracts of Federal coal must be recognized for what they are - isolated tracts of coal with a market subject to interest of the potential purchaser.

In closing, I quote Mr. Walter E. Will who, while discussing oil and gas pooling projects, presented ideas applicable to coal:

. . . "it is my opinion that it is difficult for a regulatory body to achieve the ultimate in preventing waste and protecting correlative rights in an oil or gas field or pool that is being produced on a competitive basis. . .

It is only through unit operation that the complete application of today's advanced technical knowledge concerning reservoir behavior can best be utilized in order that the greatest ultimate recovery be obtained and it is through unit operation that individual property rights can be fully protected."

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VALUATION OF SURFACE ESTATE

C. E. Brownell

Background

A significant amount of Federal Coal land is located under privately owned surface.

Section 712 of the Surface Mining Control and Reclamation Act of 1977 (SMCRA) provides that, in cases where Federal Coal is overlain by private surface owned by a special class of owners, the Secretary may not issue a coal lease for mining purposes unless the surface owner has granted, in writing, valid consent to conduct such mining operations.

Subsequent to passage of SMCRA with its surface owner consent provision, concern developed that high or excessive payments by coal companies to surface owners for this consent would reduce the price that the federal government could receive for leasing the Federal Coal.

In an attempt to ensure that full fair market value is received for Federal Coal under private surface, the Department has adopted a policy which, it is hoped, will limit the payment for surface owner consent. The policy is that, in the processes of estimating fair market value of the Federal Coal, the actual damages, or loss in value to the private surface will be used as the allowable cost of surface owner consent.

Appraisals of the surface estates will be necessary in order to obtain the estimates of surface values to be used in the Federal Coal Valuation processes.

Any proposed lease of Federal Coal under private surface could involve all or portions of several different surface ownerships. Even though a lease may underlie only a portion of a total surface ownership, the proposed mining operation may affect the value of the total ownership. The actual loss in value then may be much greater than the fair market value of the acreage directly involved by the lease and the mining operation. Therefore, in order to properly estimate the loss in value to the surface estates, it will be necessary to make complete and separate appraisals of each ownership.

Valuation Process

Generally, the appraisals will have to be made in the same manner as one would appraise property being taken for a public purpose:

1. Estimate the value of the part of the property being taken;
2. Estimate the damage or loss in value to the remainder of the property.
3. Add the value of the part taken to the loss in value to remainder to arrive at the estimate of value of the surface estate involved or the loss in value to the total property as the result of the taking.

To consider loss in value to the total property one must first determine what constitutes the total property. In making this determination there are certain criteria to be considered. The criteria for determining what constitutes the larger parcel ^{1/} are that the parts of the property must have:

1. Unity of Ownership
2. Unity of Use
3. Contiguity

In order to ensure that the estimates of value do not reflect values that are attributable to the underlying coal, the appraisal should be based on consideration of uses which are not related to coal. It should also be based on sales of similar land which are not related to coal or which have no underlying mineral.

The estimates are derived by following the standard appraisal process using any or all of the approaches to value (Cost, Income, and Market) that are applicable. The part taken is valued as part of the whole (larger parcel) which reflects its contribution value to the whole. The damages to the remainder are estimated by consideration of changes in use and in highest and best use. The remainder is valued as viewed before the taking and then valued, as viewed after the taking. The difference between the value of the remainder before the taking and the value after the taking is the measure of damages or loss in value to the remainder. The value of the part taken added to the loss in value to the remainder is the estimate of value of the surface estate taken.

^{1/} Larger parcel is the term applied to the total ownership from which a portion is being taken.

The proposed mining operation will have a definite life span and probably will not encumber the total of the surface estate overlying the coal for the entire life of the project. The appraiser must consider what rights in the surface estate remain with the owner such as use of areas not involved by actual mining and reversion of surface use at the end of mining. The condition of the lands and potential uses during and after mining must be considered as well.

If the taking constitutes the entire surface ownership (larger parcel) the appraisal is merely an estimate of the fair market value of the land considering, of course, value of any rights remaining with the owner.

DRY RUN OF COMPARABLE LEASE APPROACH
TO ESTIMATING FAIR MARKET VALUE OF FEDERAL COAL

C.E. Brownell

The purpose of the Dry Run or Sample Appraisal was to:

1. Sample the availability of comparable lease data in an actual case;
2. Sample the availability of specific data regarding the Federal Coal resource in an actual case;
3. Test for problems that might be encountered in applying the comparable lease approach;
4. Verify the applicability of the comparable lease approach to estimating the fair market value of Federal Coal Leases.

Methodology Used in Sample Appraisal

A. Tract Selection

A tract 9 sections in size, was selected at random from a map showing known coal bearing areas in Southern Wyoming. The map did not show who owned the coal or surface estate. After the tract was selected, other maps and plats were consulted to determine the ownership of coal and surface. The description of the tract and ownership of coal and surface is as follows:

T.18N., R90W.,

Section 6;	NE ⁴ , S ² ;	Federal Coal - Federal Surface
	NW ⁴	Federal Coal - Private Surface
Section 7;	All	Private Coal - Private Surface

T.18N., R91W.,

Section 1;	All	Private Coal - Private Surface
Section 2;	All	Federal Coal - Federal Surface
Section 11;	All	Private Coal - Private Surface
Section 12;	All	Federal Coal - Federal Surface

T.19N., R90W.,

Section 31;	All	Private Coal - Private Surface
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T.19N., R91W.,

Section 35;	All	Private Coal - Private Surface
Section 36;	All	State of Wyo.- State Surface

The tract includes 3 sections (approximately 1900 acres) of Federal Coal rights of which approximately 160 acres is under private surface. It is located 20 miles southwest of Rawlins, Wyoming in Carbon County. This places the tract some 50 miles southwest of Hanna which is more or less the center of a number of active strip-mine coal operations. The mining activity in the general Hanna area dates back to the early 1900s.

B. Obtaining Data On the Federal Coal

Bureau files were consulted to determine what if any information was available regarding the coal resource on the

Federal Lands within the sample tract.

It was discovered that seven of the nine sections were included within the external boundaries of a mining operation proposed by two coal companies under a joint venture agreement. The overall plan encompassed about 27 sections (17,000 acres +/-) of land within a checkerboard pattern of ownership of Federal, State and private lands. It included approximately 4200 acres of Federal Coal located within eight cornering, but noncontiguous sections. Approximately 960 acres of the Federal Coal is within the sample tract.

The reports submitted by the coal companies showed locations of the coal deposits and provided specific information regarding total reserves, recovery rates, test data, quality of the coal, mining methods, transportation plan, etc.

It was also found that U.S.G.S. had completed a report on the proposed mining operation. The GS report provided much the same information as the coal company report but differed slightly in some areas, such as projected reserves, recovery rate, etc.

C. Search for Comparable Leases

An abstractor was hired to search the Carbon County records for evidence of coal leases or assignments of

coal leases recorded from January 1, 1975 to the present time. The cost of these services amounted to approximately \$1400. The abstractor furnished information regarding several recent leases for uranium and other minerals, but reported that he had found no coal leases as such recorded during the prescribed period of time.

Mr. Dale Wadleigh, who assisted on the project searched the County records for earlier dates and found evidence of eight transactions dated in the period 1971 to 1974. Five of these transaction involved lands located some 35-40 miles to the southwest of the sample tract. The others were scattered about the County.

Mr. Wadleigh contacted the State of Wyoming Department of Lands to determine whether the state sections within the sample area (or the mining unit discussed earlier) were under lease. It was learned that these state sections were originally leased in August of 1968 on a 10 year lease which called for \$50 per year rental for each 1280 acres for years 1 and 2. The rental became 25¢ per acre for years 3 through 10 or \$1.00 per acre rent after any discovery of coal was made. The lease called for a royalty of 7% or 15¢ per ton minimum royalty. The lease was involved in one or more assignments.

The state lease was renegotiated and renewed for 10 years in August, 1978. The terms call for an 8% royalty with a minimum 25¢ per ton plus overriding royalties of .5% and .1666% to two interim lessees. The rental rate was 50¢/acre for years 1-5 and \$1.00/acre for years 6 and beyond. The total royalty and overriding royalty amounts to 8.666%. The rental would be a maximum of \$1.00 per acre per year.

I contacted a representative of one of the two companies involved in the joint venture - proposed mining operation. I was advised that the private coal lands within the proposed mining operation are owned by a railroad company which has an intricate corporate structure with several subsidiary companies. One company is a land resource company and another is a mineral development company. There are more or less "in house" leases and agreements between the resource company and the mineral company which call for payments to be made or credited from one company to the other. There are also agreements between the two companies involved in the joint venture - proposed mining operation. According to the information received, these companies are using a $12\frac{1}{2}\%$ royalty rate for the "in house" leases and agreements. The representative indicated it was his understanding that the $12\frac{1}{2}\%$ rate was adopted from rates used in oil and gas transactions.

Mr. Wadleigh, Mr. Pogue (Colorado BLM State Office who also assisted on the project) and I also considered other lease data which we had in our files. This other data had been gleaned from records and other sources in Carbon County, Utah; Emery County, Utah; Moffat County, Colorado; Rosebud County, Montana; and Powder River County, Montana. Because of the location, proximity to the sample tract, and recency of the data in Moffat County, Colorado, the appraisers felt that this data would have more general applicability to the sample tract than the other areas. All of the available data was tabulated and subjected to a limited analysis. It had been the intent of the appraisers to conduct further work, verification, and additional analyses on the Moffat County data to test its applicability to the sample tract. Unfortunately, because of the press of other high priority appraisal work by all three appraisers this was not accomplished.

Results of the Sample Project

The project showed that there was less than the ideal amount of recent transaction data, involving coal and lands in the immediate vicinity of the sample tract available. This probably could have been anticipated because of the long history of coal mining in the general area, and because of the large amount of land in railroad ownership.

It is highly probable that if the search had been extended to adjacent counties, as would be done in an actual appraisal,

additional transaction data would have been discovered. Also it is believed that, had more time been available to properly analyze the transactions in Moffat County Colorado and to obtain data which is known to exist in Routt County Colorado, it would have been found that some of this Colorado data would have applicability to the sample tract area. At least in the analysis work that was done, the appraisers found nothing to indicate that this somewhat distant data would not have applicability.

Analysis of the raw data available (from Wyoming, Colorado, Utah, and Montana) shows royalty rates that are, with the exception of recent State of Colorado leases which adopt federal minimum rates, less than $12\frac{1}{2}\%$. It shows an almost total absence of advance payments that could be interpreted to be bonus payments. The bonus payments that were found would have to be considered as nominal.

From this limited analysis it appears that the royalty rates for many of the leases are being derived from, or arise from consideration of factors that are not directly related to the quantity, quality, etc., of the coal itself. These factors include federal coal royalty rates and oil and gas royalty rates. If additional research in actual appraisals shows the same results, it is possible that lease data would have applicability over broad geographic areas.

Conclusions

The results of the sample appraisal was not as conclusive or definitive as had been hoped. This is primarily due to the fact that the appraisers working on the project were unable, due to previous high priority commitments, to spend the needed amount of time on the project.

This sample (because of the ownership pattern and the long history of coal activity in the area) may have exhibited some of the extremes in finding comparable data. Other areas in earlier stages of the development cycle may prove to present much easier appraisal situations.

Although the project results are not conclusive, there was nothing found that would indicate that the approach can not be worked, given the time and manpower necessary to do the work properly. The best test will be using the approach in actual appraisal situations in a number of areas over a period of time.

PROCESS OF ESTABLISHING MINIMUM ACCEPTABLE

BIDS ON FEDERAL COAL LEASES

C. E. Brownell

The laws and regulations authorizing and governing sales of federal coal leases provide that such coal leases shall not be sold at less than fair market value. The minimum acceptable bid should then be established as the fair market value of the lease, or rather, the estimate of fair market value of the lease as determined by appraisal.

Using the fair market value estimate as the minimum acceptable bid is the method used by the Bureau of Land Management for establishing minimum acceptable bid prices in the competitive sales of land, timber and certain other resources which call for fair market value or not less than fair market value. It is also the method used for establishing purchase prices for lands and resources to be sold at direct, negotiated, or non-competitive sales. These practices serve as a precedent for using the estimate of fair market value as the minimum acceptable bid for coal leases.

The minimum acceptable bid (estimate of fair market value) for the proposed coal lease should then be published as part of the notice of lease offering or lease sale. All bids received or offered at the sale which fall below the published minimum acceptable bid should be rejected and returned to the bidder.

Establishing a minimum acceptable bid in this manner has several advantages:

- A. It eliminates the need to have a post sale panel go through any manipulation process to determine which bids should be accepted and which should be rejected.
- B. It will add credibility to the sale process and aid potential bidders in preparing bids.
- C. Once industry is assured that bids below the published minimum acceptable bid will be rejected, there should be an end to nuisance bids.

It has the disadvantage, of making appraisals more important than in the past, and of requiring more accountability from personnel conducting the appraisals. It should not increase administrative costs as appraisals of fair market value will be necessary anyway to ensure that no coal is sold at not less than Fair Market Value. If the estimate of Fair Market Value by appraisal is used as the minimum acceptable bid it would eliminate the need for and cost of using an additional method for establishing the minimum acceptable bid.

The fair market value estimate should be derived by following the standard appraisal process using the two approaches to value which are applicable, the Income and Market Approaches. It will also be necessary to consider the comments regarding fair market value solicited from the public as provided by the regulations.

This estimate should be derived as follows.

- A. Develop an estimate of value through the Income Approach (Discounted Cash Flow).^{1/}
- B. Develop an estimate of value through the Market Approach (Comparable Lease Approach).
- C. Consider the public comments regarding fair market value to the extent merited by the quality and validity of the comments and information presented.
- D. Reconcile the indications of value by the two approaches and the public comments. Arrive at an estimate of fair market value which becomes the minimum acceptable bid price,^{2/} or:
- E. If the estimate of fair market value falls below the minimum royalty and bonus rates established by the regulations, the regulatory minimum becomes the minimum acceptable bid price.

1/ This assumes that the Discounted Cash Flow process is based on premises and factors which are in keeping with the concept of fair market (value to persons generally) rather than premises which would result in Value-in Use and factors which are derived by artificial methods. These premises and factors include.

- A. The federal coal to be leased has to be considered as a separate entity and not as part of a mining unit which would include consideration of coal of other than federal ownership.

- B. Cost figures, mining methods, and other factors relating to the hypothetical mining operation must be typical of the industry and not based on an adjoining mining operation or those of a specific mining company.
- C. Profit rates, interest rates, and discount rates must be typical of the industry orderived from consideration of comparable investments having similar risks.

The Discounted Cash Flow process contemplated here differs from the Discounted Cash Flow Model used by USGS in developing the Coal Resource Economic Value (CREV). The CREV is a measure of Economic Rent which only under ideal almost unattainable conditions would coincide with FMV.

- 2/ In absence of a Discounted Cash Flow designed to provide an estimate of Fair Market Value (Not Economic Rent) the reconciliation will necessarily consist of review of the comparable lease approach and consideration of comments from the public.

COMPARABLE LEASE APPROACH TO ESTIMATING
FAIR MARKET VALUE OF FEDERAL COAL LEASES

C. E. Brownell

The comparable lease approach to estimating fair market value of federal coal leases is a variation of the Market Data Approach to value used by appraisers in estimating a wide variety of real property, personal property, or commodities.

The approach is based on the principle of substitution - a purchaser would not be justified in paying more for a property (or resource) than it would cost to acquire an equally desirable substitute property (or resource).

The comparable lease approach is a process of relating the coal lease under appraisal to comparable leases in the market.^{1/} The lease under appraisal is compared to the comparable leases for those factors which market investigations demonstrate have an effect on value or price of coal leases.^{2/}

The approach is applied following an orderly more or less standardized appraisal process which can be outlined as follows:

A. Definition of the Appraisal problem

1. Identification of the coal property to be appraised by legal description and acreage. In cases where the federal government does not hold fee simple title to the property being appraised,

this identification must include a legal description, ownership and nature of any portion of the total ownership not held by the federal government such as, surface estate, surface rights, oil and gas rights, rights to other minerals, etc. Total ownership refers to the property bearing federal coal to be leased and not the land within some logical mining unit which includes coal of other than federal ownership.

2. Identification of the rights to be appraised. Generally this will be the rights to explore for, extract, process, produce, and sell coal from the described property. May or may not include the rights to use the surface for mining or access purposes.

In valuation theory, it is not the property or resource which has value but rather the rights that go with ownership of the property or resource that have value. Therefore it is essential to know what rights are to be considered in the appraisal.

3. Identification of the terms and conditions of the proposed lease.

It is the terms and conditions of the proposed lease that will dictate the manner in which the rights to be leased are to be exercised. These may have a direct bearing on the market value of the coal being leased.

4. Date of the Value Estimate.

Inasmuch as market conditions and values may change rapidly, the

appraiser can only be responsible for a value estimate as of a specific point in time. Generally the date of valuation will be as of the last date of examination of the property by the appraiser.

5. Purpose of the Appraisal.

Inasmuch as appraisals may be made to serve many purposes, it is necessary that the appraiser and those who will use the appraisal understand and agree on the specific purpose which the appraisal will serve. In the case of coal leases, it will generally be to estimate the fair market value of the rights in the coal to be leased for a specified time and under the conditions spelled out in the lease. As mentioned under 2 and 3 above, as the rights and terms change, the value could change. Therefore it is necessary to tie the purpose of the appraisal to the rights, terms, and conditions of the lease under appraisal.

6. Definition of Value.

Inasmuch as appraisals can be made to suit several different definitions of value, it is necessary that the appraiser and those who use the appraisal understand under which definition of value the appraisal is being made. In coal leases the appraisal is to consider fair market value defined as:

"The amount in cash, or on terms reasonably equivalent to cash, for which in all probability the property would be sold by a knowledgeable owner willing but not obligated to sell to a knowledgeable purchaser who desired but is not obligated to buy." ^{3/}

or

The amount in cash, or on terms reasonably equivalent to cash, for which in all probability the rights to mine, produce, and sell coal would be leased by a knowledgeable owner willing but not obligated to lease to a knowledgeable lessee who desired but is not obligated to lease.

B. Preliminary Plan

1. Identify the data needed.

In advance of commencing field work on the appraisal it is advisable for the appraiser to identify the types of general and specific data that will be needed to complete the appraisal. In most cases the general data needed will be much the same for any coal lease appraisal. However, the specific data, particularly that pertaining to actual coal transactions may vary depending on the size of a coal tract and the rights to be appraised. For example, an appraisal involving a small tract of federal coal, federal surface with guaranteed access would call for data involving similar sized tracts leased under similar conditions (assuming that the size of the tract may have a bearing on value or price). The appraiser then, in order to make most expeditious use of his time, should concentrate his/her efforts in obtaining the type of data needed rather than collecting data at random.

2. Identify Data Sources

Based on past experience or experience of others doing similar work,

the appraiser should in advance identify those sources of data that will prove to be most helpful. The general data may come from government (any level) reports, trade journals, industry reports, etc. The specific data may be gained from county records, abstracting companies, title companies, industry representatives, brokers, lawyers, landowners, etc.

C. Data Collection and Analysis.

1. General Data - In order to develop an understanding of the market and market conditions it will be necessary for the appraiser to obtain an adequate amount of data on the national, regional, and local scale that will tend to show the economic and demand trends that exist in the coal market. There may be events taking place on an international scale such as long range oil prices and increased demand for energy worldwide that could affect the demand for and value of coal on the local scale. In the analysis phase, the appraiser must determine the direction, magnitude and duration of these trends and their probable effect on the value of the coal lease under appraisal.

2. Specific Data

The specific data needed pertains to the subject property and comparable leases. In order to compare the subject lease to market transactions, the appraiser has to have a clear and detailed knowledge of the subject property. This should include access to, location, nature and extent, physical properties, and occurrence of the coal deposit.

The data needed for the comparable transactions^{4/}, in addition to the same data listed above for the subject property, includes, verification, date of transaction, understanding of the terms and conditions of the leases, bases for payments, and if possible an understanding of the factors considered by lessors and lessees in the price negotiations.

In the analysis the appraiser will have to determine which leases are valid as indicators of value, what factors of comparison are to be used in the comparisons, etc.

D. Valuation

1. Comparison of subject coal lease to the selected comparable leases.

Ideally, the leases to be used for comparison would be of identical coal properties located adjacent to subject. However, no two properties are identical. They will differ in at least some respects. The appraiser should select those leases which are most similar to subject for comparison. The more similar the comparable leases are to the subject, the fewer the differences that need to be considered. The appraiser has to make comparisons, or adjustments, for the differences in those factors which market investigations have demonstrated do affect value or price of coal leases. It would be incorrect for the appraiser to make adjustments for factors which are in fact not considered by buyers and sellers in the market.

The appraiser cannot, with any certainty, predict in advance of

of the comprehensive market investigation the factors which should be used in the comparisons. In the market, many events can take place that will change the motivation and expectations of buyers and sellers and change the considerations in the price negotiations.

It would be misleading, in this paper, to list any factors or set of factors as suggested factors to be considered in the comparisons. To do so would imply that there are more or less standardized factors.

2. Value Conclusions

Assuming the appraiser has properly analyzed the market data and actions and weighed the differences and similarities between market data and subject, the comparisons or adjustments should lead the appraiser to a logical conclusion of value.

The process of arriving at a conclusion of value by any approach to value is a review of the steps taken previously, a weighing of the merits of the data considered, and reaching a conclusion. It is not a mathematical process in which the various indications are averaged or the numbers manipulated in some similar fashion.

E. Reconciliation of Indication of Value by Comparable Lease Approach with Indications derived by other Approaches.

The indications of value by the different approaches will usually show a

range of values. The range may be narrow or it may be extremely wide.

Reconciling these indications of value involves a process of reviewing the different approaches. The reliability of the various data that has been used in developing each approach is considered along with the inherent strengths and weaknesses of each approach.

If the indicated range of values is wide the appraiser should retrace the steps taken in each approach to determine whether some error has been made in one or more of the approaches. After the review of the approaches has been completed, the reliability of the data and the strengths and weakness of each of the approaches have been considered, the appraiser reaches a final conclusion as to the estimate of value. This estimate should either be the indication by one of the approaches or within the range of indications with most weight given to the approach that is considered to be the most reliable. This estimate should never be arrived at by averaging the indications by the different approaches.

Finally, before releasing this estimate of value, the appraiser should apply what is often referred to by appraisers as the "4th Approach" to value. That is to look at the estimate of value and what it represents in light of what he really believes knowledgeable buyers and sellers in the market would do in that situation.

Footnotes

1/ A comparable lease can be defined as a lease of similar resource, which

when subjected to an analysis of the pertinent facts, will logically indicate by adjustment and comparison the probable price that could have been obtained for the resource under appraisal on that certain date of valuation. In theory, the resource involved by the comparable lease would be, if it were available for lease at the same time as the coal lease under appraisal, in competition for the same potential buyers.

- 2/ The appraiser must guard against the proclivity to interject his/her notions into the comparisons instead of relying on the actions of buyers and sellers in the market. One must also guard against being more sophisticated than the buyers and sellers in making these comparisons.
- 3/ Uniform Appraisal Standards for Federal Land Acquisitions, pg 3.
- 4/ Transactions include leases, assignments of leases, etc.

RECOMMENDED SALE PROCEDURES

C. E. Brownell

It is recommended that coal lease sales be open public auctions, with both sealed and oral bids, conducted along the following format.

1. Publish a notice offering leases for sale.

The notice should include:

- a. Time and place for Auction.
 - b. Instructions for filing sealed bids.
 - c. Description of Auction procedures.
 - d. Minimum acceptable bid for each lease being offered.
 - e. Notification that any bids, sealed or oral, which are less than the established minimum acceptable bid will be rejected.
2. At the published time and place, all sealed bids, which have been submitted in accordance with established requirements, are opened, analyzed, and posted. Any and all sealed bids below minimum acceptable bids are identified and set aside for rejection.
 3. In multi-tract sales, establish an order or sequence for subsequent oral bidding with the tract which received most sealed bids first, next greatest number of sealed bids second, etc.
 4. Start oral bidding with highest sealed bid as the starting point. Tracts for which no sealed bids were received, the published minimum acceptable bid would be the starting point for oral bidding.
 5. At the close of oral bidding for each tract, the highest bid, sealed or oral should be identified as the successful bidder - subject to post sale adjudication and verification of the qualifications of that high bidder.
 6. The post-sale process should consist of adjudication and verification of qualifications of the high bidder and if appropriate, preparation of notification to the high bidder of being the successful bidder. This notification should include instructions to the high bidder for actions to be taken to execute the lease.

Disadvantage of this process

It could encourage prospective buyers to either submit sealed minimum acceptable bid or no sealed bids, waiting for the oral auction.

This could partially be overcome by making a sealed bid a prerequisite to subsequent oral bidding. However, such a requirement might reduce activity for other tracts as described under advantages below.

Advantages of this Process

1. It would allow potential buyers to raise their bids after learning the level of competition they were facing. Sealed bids alone more or less lock them into one price.
2. It would allow potential buyers to consider more than one tract at a sale. Potential buyers who were unsuccessful in being the high bidder for tracts offered earlier in the oral auction would be released to bid on tracts offered later in the oral auction.
3. It should tend to ensure that the best coal tracts (cheapest national cost) offered at any given sale should sell first.
4. It should eliminate nuisance bids below the minimum acceptable bid.

It is further recommended that consideration be given to use of "Continuing Sale Procedures" for sales of coal lease much in the same manner the Bureau of Land Management has used for some land sales. The procedures for coal lease sales could be as follows:

1. On the prescribed date and place, the initial sale is held. If any tracts (leases) remain unsold at the end of the oral auction, announce that sale is adjourned, and all remaining tracts will again be offered for sealed and oral bids on a specified day, usually 30 days ± hence.
2. On the specified day of the next sale date, the sale is resumed with opening of sealed bids and subsequent oral bidding. If any tracts remain after this sale, repeat adjournment with sale to be reopened again on the specified day, etc.
3. This procedure could be continued for a period of say 5 months. Then provide for over-the-counter sale for any remaining tracts for a 30 day period after which the sale would be cancelled and any remaining leases removed from sale.

The continuing sale procedure has definite advantages. It would:

1. Eliminate repeat appraisals.
2. Provide a "ready supply" of coal leases available for purchase with a minimum of added cost to the Government, thereby fulfilling our mission.
3. Encourage interest from "Brokers" or holding companies who put packages

together for later sale to producing companies. In doing so it would broaden the potential market for leases and increase competition.

4. Place the burden (on potential buyers) of keeping track of what happens on subsequent sale dates. It could encourage them to buy leases that they might otherwise not buy at a single sale. In the single sale process, a potential buyer might be interested in a lease but only if he/she can buy at a price which is totally an advantage to them. If no competition is observed, they might not bid expecting that the lease would again become available at a later date and preferably at a lower price. The continuing sale procedure might encourage that same potential buyer to buy, fearing that someone else may bid the minimum or higher on one of the continuing sale dates or pay the minimum during the over-the-counter sale period.

It could have an effect which might be considered to be a disadvantage, that of encouraging "speculation" by Brokers or holding companies. However, if one considers what has taken place in private coal markets and oil and gas, this may not be a disadvantage, particularly in leases or tracts that are of mixed ownership or smaller than economic units. It is often the work of Brokers or Speculators who through their leasing techniques put together economic units that are either sold to producing Companies or become operating properties through use of operating leases or assignments. We may be overlooking an important facet of the market for coal leases if we exclude the Brokers and Speculators.

On Estimating the Degree of Uncertainty in a Federal Mineral Lease Value Estimate

Donald J. Bieniewicz
July 26, 1979

The degree of uncertainty in its estimate of the true value of a Federal mineral lease should be considered by a firm in its preparation of a bid for the lease, and considered by the government in its decision to accept or reject the high bid for the lease. This paper explains how the commonly used Monte Carlo approach to tract evaluation does not provide an estimate of the (degree of) uncertainty in the tract value estimate, and shows how this uncertainty can be estimated.

Assume that at the time it is sold, a Federal mineral lease has a potential value distribution V with mean μ and variance σ^2 . Then the true value of the property, i.e., the maximum amount a risk-neutral purchaser should pay for the property, is μ .

Now assume that V is a function of several other random variables, X , Y , and Z . This can be expressed $V = f(X, Y, Z)$. Suppose that this relationship is too difficult to calculate analytically, i.e., even if we know the shape and parameters of the probability distributions of X , Y and Z , we cannot readily calculate the corresponding shape and parameters of V . In such a case we would use Monte Carlo techniques to find $\hat{\mu}$ and $\hat{\sigma}^2$ which are estimators of μ and σ^2 . $\hat{\mu}$ and $\hat{\sigma}^2$ are the parameters of \hat{V} , which is the distribution of the outputs of function $f(X, Y, Z)$ based on a limited number of random draws from the X , Y and Z distributions.

If a bidder is risk neutral, he is not concerned about the value σ^2 or its estimator $\hat{\sigma}^2$. He is, however, concerned about the accuracy of his estimate of μ , particularly because biases may exist in his estimation technique. If his technique is biased, he will be either too low or too high in his bidding on the average and will reap suboptimal long term profits. The government is also concerned about the accuracy of its estimate of μ , because it must depend on this estimate in making bid acceptance-rejection decisions.

Various techniques have been developed to reduce the error caused by the use of Monte Carlo approximation methods in the estimate of μ . In general these are called variance reduction techniques and their goal is to provide a smaller range of approximation error in $\hat{\mu}$ as an estimator of μ for the same expenditure of calculation time or effort. Note that variance reduction techniques do not reduce $\hat{\sigma}^2$ or σ^2 nor are they generally used to reduce the approximation error in $\hat{\sigma}^2$. Variance reduction techniques might less ambiguously be called mean-estimator approximation error reduction techniques.

Now consider the case where the distributions of X , Y and Z are unknown, but can be estimated. Suppose we make our best estimates of the distributions of X , Y and Z and then use Monte Carlo methods to solve for $\hat{\mu}$ and $\hat{\sigma}^2$. This is the common approach to lease evaluation. Now the question of most importance to us or a risk-neutral bidder is how good is this estimate of μ , i.e., how close is

$\hat{\mu}$ to the true value of the lease, μ ?* Unfortunately, the above approach does not yield this information. Because only a single set of X, Y and Z distributions are used, in effect, the common Monte Carlo approach to lease evaluation provides only a single estimate of the true value of the lease, μ . What is needed is an estimate of the variance of $\hat{\mu}$, our estimator of true value μ .**

One way to get an estimate of the variance of $\hat{\mu}$ is to change how we think of the input distributions in our Monte Carlo model. Instead of inputting our best estimates of the distributions of X, Y and Z, we now input our best estimates of the probability distributions of our estimates of \bar{x} , \bar{y} and \bar{z} , which are the true means of the X, Y and Z distributions. We must also hope that μ is approximately equal to $f(\bar{x}, \bar{y}, \bar{z})$. The output of the Monte Carlo model will now be the desired estimate of the distribution of $\hat{\mu}$, i.e., the variance output is now the estimated variance of our estimator of true value μ , and the mean output is the mean of our estimator of μ . If we choose to use the mean of the Monte Carlo output (call it $\hat{\mu}_1$ to distinguish it from our original estimator of μ) as our estimator of μ , then we can consider the variance output to be a measure of the uncertainty of this estimate of μ .

* Assume the use of variance reduction techniques and many sets of random draws from X, Y and Z so that the error from the approximation technique is insignificant and the uncertainty of the Monte Carlo outputs is based only on the uncertainty of the estimated input X, Y and Z distributions.

** Note that σ^2 is an estimate of the variance of V and not an estimate of the uncertainty of our estimate of true value μ .

If the calculated values of $\hat{\mu}$ and $\hat{\mu}_1$ are found to be very close, then they can for practical purposes be considered to be the same estimator and that the estimated variance of $\hat{\mu}_1$ applies to either. However, it is possible that $\hat{\mu}$ and $\hat{\mu}_1$ will differ considerably, especially if μ is not approximately equal to $f(\bar{x}, \bar{y}, \bar{z})$. In this case, the original estimator of μ , $\hat{\mu}$, may be preferred. However, the Monte Carlo outputs for the $\hat{\mu}_1$ case can still prove to be useful. By assuming that the relationship between $\hat{\mu}$ and its variance is similar to that of the relationship between $\hat{\mu}_1$ and its variance, the variance of $\hat{\mu}$ can be estimated.

To summarize, because μ , the mean of the potential value distribution V , is the true value of a lease at the time it is sold, the uncertainty in the estimated value of μ is the proper major uncertainty for a risk-neutral bidder to consider in his bidding decisions or for the government to consider in its bid acceptance-rejection decisions. This uncertainty is not estimated in the usual Monte Carlo tract evaluation procedures, the more common uncertainty estimated being σ^2 which is the variance of V . The degree of uncertainty in the estimate of μ can be estimated, however, using a slight variation of the traditional Monte Carlo approach. Where V is a function of several random variables such as X , Y and Z , instead of using the estimated distributions of X , Y and Z in the Monte Carlo model, the estimated probability distributions of the means of X , Y and Z are used as model inputs. Then the variance of the model outputs provides a measure of the uncertainty of the estimate of the true value of the lease, μ .

Appendix: Calculation of the Probability Distribution of the
Expected Internal Rate of Return on Investment

This paper explained how to estimate the uncertainty in a Federal tract value estimate in terms of a probability distribution of mean present value based on a given discount rate. However, in order to be able to consider this uncertainty in the government's bid rejection procedure, it may be preferable to have this uncertainty expressed as a probability distribution of the expected internal rate of return (ROR) on investment.

This latter distribution would be calculated using the same basic Monte Carlo approach as would the former. As before, our best estimates of the probability distributions of \bar{x} , \bar{y} and \bar{z} would be input into the Monte Carlo model. However, instead of calculating the present value of each random set of \bar{x} , \bar{y} and \bar{z} values during each Monte Carlo loop, the computer should iterate until it finds a discount rate that yields a zero present value for each set of \bar{x} , \bar{y} , and \bar{z} values. This discount rate is the internal ROR of that loop. The internal ROR from each loop should be saved and after a sufficient number of loops, the saved RORs should be printed out in the form of a probability density. This probability distribution reflects our estimation of the accuracy with which we are able to estimate the average rate of return of the lease.

AN ANALYSIS OF ALTERNATIVE METHODS
FOR ESTIMATING THE EXPECTED ECONOMIC RENT
OF A FEDERAL COAL LEASE

Donald J. Bieniewicz
Office of Policy Analysis
U.S. Department of the Interior

Draft: October 17, 1979

Introduction and Summary

The most important factor for use in determining the minimum acceptable bid, also known as the reservation price, for a Federal coal lease is the government's estimate of the expected economic rent, in present value terms, of future coal production from the lease. Because of the analytic intractability of the general problem, the most common approach to estimating the expected economic rent of a mineral lease is Monte Carlo simulation. However, in some cases, the expected rent can be estimated without resort to the usually elaborate simulation techniques.

In keeping with this latter observation, this paper presents an alternative to utilizing Monte Carlo simulation for estimating the expected economic rent of a Federal coal lease: a direct application of the expected value operator to the general function representing the economic rent of a lease. It is shown that, for coal, the expected rent equals the general rent function evaluated at the point where all of the function's arguments, such as price and cost, are equal to their individual expected values. This equivalence allows the expected rent to be estimated via a single computation. This equivalence also allows for Monte Carlo methods to be employed in a more beneficial way than the usual; i.e., instead of also providing an estimate of the variance of the rent which is not a particularly useful output, Monte Carlo methods can instead be utilized to provide an estimate of the accuracy of the government's estimate of the expected rent which is the second most important factor for use in determining reservation prices.

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The paper begins by defining the term "expected value" and describing the properties of the expected value operator. The use of the expected value operator is then compared to other methods of calculating the expected value. Next, the general function for the economic rent of a mineral lease is presented. This rent function is then reformulated and simplified, based on the specific economic characteristics of coal production, into a form suitable for evaluation via the expected value operator. A second general formulation for economic rent, based on slightly different assumptions, is developed and similarly evaluated.

The Expected Value Operator

In mathematical statistics, the expected value, or mean value, of a discrete random variable is defined to be the sum of the possible values of the variable multiplied individually by their likelihood of occurrence. In more common terminology, the expected value is referred to as the weighted average.^{1/} The expected value of a function of several discrete random variables is defined similarly to be the sum of the values of the function, when ranged over all possible combinations of the component variables and multiplied individually by the likelihood of occurrence of each combination. In the case of continuous random variables, the expected value of a function is the multiple integral of the product of the function and the probability densities of its arguments.

^{1/} Introduction to Probability Theory, by Paul G. Hoel, S.C. Port, and C. J. Stone, p. 83, Houghton-Mifflin, Boston, 1971.

Finding the expected value of a function of more than one variable can be simplified by the use of the expected value operator E having the following functional properties:^{2/}

For constants a and b , for random variables X and Y , and for general functions $f(\cdot)$ and $g(\cdot)$:

$$E[a] = a$$

$$E[X] = E[X]$$

$$E[aX] = aE[X]$$

$$E[af(X)] = aE[f(X)]$$

$$E[aX + bY] = aE[X] + bE[Y]$$

$$E[af(X) + bg(Y)] = aE[f(X)] + bE[g(Y)]$$

$$E[aXY] = aE[XY]$$

$$E[af(X)g(Y)] = aE[f(X)g(Y)]$$

If X and Y are independent random variables, then the last two relationships can be simplified further:

$$E[aXY] = aE[XY] = aE[X]E[Y]$$

$$E[af(X)g(Y)] = aE[f(X)g(Y)] = aE[f(X)]E[g(Y)]$$

^{2/} See Introduction to the Theory of Statistics, Third Edition by Alexander M. Mood, F. A. Graybill, and D. C. Boes, p. 70, 160, McGraw-Hill, New York, 1974.

Suppose we wish to find the expected value of a function, say $h(\cdot)$, of several random variables, say X , Y , and Z . From the above properties, we can easily show that if we know the individual expected values of X , Y , and Z , and know that X , Y , and Z are independent, and know that $h(\cdot)$ contains no fractional or multiple powers of X , Y , and Z , then we can directly calculate the expected value of $h(\cdot)$ by simply substituting $E[X]$, $E[Y]$, and $E[Z]$ in $h(\cdot)$ in place of X , Y , and Z , respectively. This relationship is expressed by the following equation:

$$E[h(X,Y,Z)] = h(E[X],E[Y],E[Z])$$

We wish to stress that the above equality does not hold in general; it is guaranteed only when two conditions hold: (1) the random variables in the function are independent, and (2) the random variables are raised only to the first power when they appear.

Examples: $h(X,Y,Z) = aXY + bYZ + cXYZ$

meets the sufficient conditions.

$$j(X,Y,Z) = (aXY+bZ)X = aX^2Y + bZX$$

does not meet the sufficient conditions.

When a function does not meet the sufficient conditions for direct calculation of its expected value from the expected values of its component variables, it may be necessary to rely on analytic (calculus-based) techniques, or, as a last resort, approximation techniques, such as numerical methods or Monte Carlo simulation, in order to determine its expected value. The increasingly common use of Monte Carlo approximation methods to estimate the expected rent of mineral leases is because the time dimension and the typically non-linear cost elements in the rent function cause the general problem to be analytically intractable. However, the more direct methods of calculation noted above are preferable, because of their simplicity and accuracy, whenever they are feasible. Thus, one should not be reassured by the use of Monte Carlo techniques in rent estimation, but should be concerned about the accuracy of the expected values so estimated, especially if no so-called variance-reduction techniques (that are actually approximation-error-reduction techniques) are used.

Suppose we wish to find the expected value of a function, say $h(\cdot)$, of several random variables, say X , Y , and Z . From the above properties, we can easily show that if we know the individual expected values of X , Y , and Z , and know that X , Y , and Z are independent, and know that $h(\cdot)$ contains no fractional or multiple powers of X , Y , and Z , then we can directly calculate the expected value of $h(\cdot)$ by simply substituting $E[X]$, $E[Y]$, and $E[Z]$ in $h(\cdot)$ in place of X , Y , and Z , respectively. This relationship is expressed by the following equation:

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Application to Federal Coal Lease Evaluation

In Federal coal lease evaluation, we wish to be able to find the expected value of the following general function for the economic rent of a lease:^{3/}

$$V = V(\vec{P}, \vec{Q}, \vec{C}\{\vec{Q}\}) = (\vec{P} \times \vec{Q} - \vec{C}\{\vec{Q}\}) \cdot \vec{D}$$

Where

V is the economic rent in present value terms.

+ denotes a vector over time of length N+K.

N is the production life of the mine, in years.

K is the number of years from the lease sale until the start of coal production.

\vec{Q} is a vector of (the quantity of) production in each annual period, with total production Q being its sum.

\vec{P} is a vector of annual prices per unit of production, expressed in real terms; i.e., adjusted for inflation.

+ +
 $\vec{C}\{\vec{Q}\}$ is a vector of annual costs (both development and production costs) as a function of the vector of production, expressed in real terms.

\vec{D} is a vector of appropriate annual discount factors.

^{3/} A more complete formulation including taxes and royalties appears in Appendix A. Because the additional elements add no content to the presentation and do not affect the conclusions, they have been dropped from the rent function in order to simplify the exposition.

If the selling price does not change over time,^{4/} then the vector symbol over P can be dropped; thus:

$$V = V(P, \vec{Q}, \vec{C}(\vec{Q})) = (P\vec{Q} - \vec{C}(\vec{Q})) \cdot \vec{D}$$

Assuming a constant rate of production over the production life of the mine, and, if over the range of likely production rates, the cost vector $\vec{C}(\vec{Q})$ is proportional to Q,^{5/} then:

$$V = V(P, Q, \vec{C}) = (\vec{I}PQ/N - \vec{C}Q) \cdot \vec{D} = (\vec{I}P/N - \vec{C}) \cdot Q\vec{D}$$

Where

\vec{I} is a vector of indicator variables equal to 1 if the year is K+1 to K+N, equal to 0 otherwise.

Q/N is the annual rate of production in years K+1 to K+N.

\vec{C} is the vector of annual costs proportional to Q.

4/ This is a reasonable assumption if it is foreseen that the coal purchase contract will contain a clause to adjust the F.O.B. price per ton for inflation, thus maintaining a constant real price through time.

5/ We are assuming that the mine will be developed in such a way that essentially all scale efficiencies are achieved, so that somewhat larger, or smaller, rates of production will not significantly change the unit production cost. Note that this can be assumed to hold even if we are quite uncertain as to what the actual production cost will be, as long as we know that whatever the cost turns out to be, it will be inelastic over the range of likely production rates projected for the mine.

Assuming that P , Q and \vec{C} are independent random variables, with K , N (and thus \vec{I}), and \vec{D} constants and noting that the arguments of the function are all of power one, then:

$$\begin{aligned} E[V] &= E[V(P, Q, \vec{C})] \\ &= V(E[P], E[Q], E[\vec{C}]) \\ &= (\vec{I}E[P]/N - E[\vec{C}]) \cdot E[Q] \vec{D} \end{aligned}$$

Thus, $E[P]$, $E[\vec{C}]$, $E[Q]$, K , N , and \vec{D} can be used to solve directly for $E[V]$, without the need for Monte Carlo approximation methods.

One may wonder about the sensitivity of this determination that expected values can be used as inputs, to the assumption that N is a constant, i.e., that the production life has no inherently random element. Actually, the stated conclusion is unaltered by variability in N as long as the annual production rate Q/N is unaffected by changes in N .^{6/} But in this case, Q and N are not independent, so we should reformulate the problem as follows:

N is the production life in years, a random variable, independent
of P and \vec{C} .

R is the annual rate of production, equal to Q/N , independent
of Q , N and \vec{C} .

^{6/} This would be the case where the production rate and the mine life are more likely to be dictated by contractual demands than by geological considerations.

Then

$$V = V\{P, N, R, \vec{C}\} = (\vec{IPR} - \vec{CNR}) \cdot \vec{D} = (\vec{IP} - \vec{CN}) \cdot \vec{RD}$$

and

$$\begin{aligned} E[V] &= E[V\{P, N, R, \vec{C}\}] \\ &= V\{E[P], E[N], E[R], E[\vec{C}]\} \\ &= (E[\vec{I}]E[P] - E[\vec{C}]E[N]) \cdot E[R] \vec{D} \quad 7/ \end{aligned}$$

Using $E[P]$, $E[N]$, $E[R]$ and $E[\vec{C}]$ in the above equation, $E[V]$ can be evaluated directly, without having to use Monte Carlo approximation techniques.

By combining the above approach and Monte Carlo methods, the degree of estimation error in the government's expected rent estimates, caused by subjective assessment, can be estimated. Subjective assessment means that $E[P]$, $E[N]$, $E[R]$, $E[\vec{C}]$, and $E[Q]$ are not known with certainty. In fact, we may be able to state our uncertainty about these expected values in terms of probability distributions for $E[P]$, $E[N]$, and so forth. In this case, it would be useful to input these latter probability distributions into a Monte Carlo model using one of our two expected value formulas, in order to provide an output probability distribution on our estimate of $E[V]$. The mean of the output distribution would be a new, unbiased estimator of

7/ \vec{I} is now a random variable, because it is a function of N ; however, because \vec{I} is a function only of N , it is independent of P and R , and thus its expected value can be factored out, as shown. See appendix B for a method of calculating $E[\vec{I}]$.

$E[V]$, and the variance of the output distribution would provide a measure of the degree of estimation error that exists in our estimator of $E[V]$; thus providing two of the most critically important factors for the proper setting of reservation prices in Federal coal leasing.

Appendix A - A More Complete Rent Value Function Including Taxes and Royalties

$$V = V(P, Q, \vec{C}) = -BD_1 + BT_1 + (\vec{I}P(1-S)/N - \vec{C}) \cdot \vec{Q}DT_2$$

This form of the rent value function incorporates the following additional constants into the value equation:

B is the cash bonus.

D_1 is the discount factor to account for the staggered bonus payment.

T_1 is the discounted proportion of the bonus payment recaptured by the lessee through tax credits on the bonus payment.

S is the fixed royalty rate as a fractional share of production.

T_2 is the fraction of net revenues retained by the firm after taxes.

$$\begin{aligned} E[V] &= E[V(P, Q, \vec{C})] = V\{E[P], E[Q], E[\vec{C}]\} \\ &= -BD_1 + BT_1 + (\vec{I}E[P](1-S)/N - E[\vec{C}]) \cdot E[Q]DT_2 \end{aligned}$$

Actually, we wish to know the bonus payment that would yield a zero expected value of V. Setting $E[V] = 0$, and solving for B we get:

$$B = (\vec{I}E[P](1-S)/N - E[\vec{C}]) \cdot E[Q]DT_2 / (D_1 - T_1)$$

Appendix B - How to Calculate $E[\vec{I}]$

Let $G_N\{n\} = \text{Prob}[N \leq n]$ be the known cumulative probability distribution function for random variable N .

K is assumed to be known.

I_i is the i^{th} element in vector I .

I_i is equal to 1 if i is from $K+1$ to $K+N$, and is equal to 0 otherwise.

Now

$$\begin{aligned} E[\vec{I}] &= E\{I_1, I_2, I_3, \dots\} \\ &= \{E[I_1], E[I_2], E[I_3], \dots\} \end{aligned}$$

Thus $E[\vec{I}]$ can be found by finding the expected value of each element separately.

For each element with $i < K+1$, $E[I_i] = 0$.

For each element with $i \geq K+1$, we find $E[I_i]$ as follows:

$$\begin{aligned} E[I_i] &= \text{Prob}[i \leq K+N] \times E[I_i | i \leq K+N] + \text{Prob}[i > K+N] \times E[I_i | i > K+N] \\ &= \text{Prob}[i \leq K+N] \times 1 + \text{Prob}[i > K+N] \times 0 \\ &= \text{Prob}[i \leq K+N] \\ &= \text{Prob}[i - (K+1) \leq N] \\ &= 1 - \text{Prob}[N \leq i - (K+1)] \\ &= 1 - G_N\{i - (K+1)\} \end{aligned}$$

Thus, all elements of $E[\vec{I}]$ can be solved for based on the known cumulative probability distribution for random variable N .

FAIR MARKET VALUE
AND THE CHOICE OF A
CASH FLOW DISCOUNT RATE

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October, 1979

(Prepared as a member of the Secretary's Fair Market Value Task Force)

Background

The purpose of employing a discounted cash flow analysis to an investment problem is to account for the time dimension of the problem. In effect, the answer to the following question is obtained; is the future flow of returns significantly greater than operating costs to pay off the contemplated investment and still yield an acceptable profit? A direct application of the technique by a prospective lease bidder in determining his bid is clearly to be expected in one form or another, and it is only a small step to extend the application of the technique from a question of profit to a question of resource value and production simulation.

In determining profit potential, future returns are subjected to compound discounting to account for interest on borrowed money, risk, and return on invested capital (usually at a rate equal to the return of the next best investment opportunity). When the technique is transferred to a question of value, the discount rate can take on a normative dimension not present in the corporate application, i.e., what should the cost of money be, what are the normal risks involved, and most importantly what ought the return be to the entrepreneur's investment? Using a relatively low discount rate will result in minimal costs and returns being imputed to investment with correspondingly larger residual economic rent being computed in the analysis. In a competitive market, this rent would normally accrue to the resource owner as auction participants bid away the "surplus" value down to the lowest return they are willing to accept on their investment. Using a relatively high discount rate would of course provide for generous returns to the investor, but drive the residual

resource value toward zero or below. Estimating in-place resource value by the discounted cash flow method is, therefore, highly dependent on determining the proper discount rate exogenously from the model.

At this point a careful distinction must be made regarding the basis for judging what constitutes a proper discount rate to be employed in a discounted cash flow model. Much literature has been written regarding the proper rate for public investment analysis in a benefit-cost context; however, in the present case we are not considering expenditure of public funds for coal development, but rather we are attempting to simulate "typical" private development for the purpose of estimating a residual portion of income over the normal costs and returns to the factors of production.

In building generalized models for the purpose of simulating industry production and pricing behavior it has been customary to specify a discount rate as a given part of the cost structure, thus leaving sale price as the computed value to bring about equilibrium. Presumably, the model builders consider the resulting relationship between discount rate and price to be reasonable. A recent study of this type used rates between ten and sixteen percent (Romani, 1977), see Table 1. Another modeling effort (Rapoport, 1978) postulated a fifteen percent discount rate for a base run, but tested the sensitivity of coal supply to changes in the discount rate.* The results indicated practical insensitivity between eight and twenty-two percent;** at higher discount rates, coal

* Similar concerns have been analyzed by the fair market value task force (see paper by Bernknof and Watson).

** This model is a "national/rest-of-world" model and therefor assumes uniform rate changes throughout the nation; if discount rates were applied descrimenatly by region, there of course would be greater sensitivity in any given region.

Table 1: Typical Discount Rates Used for Surface Mine Simulation.

Mine Type and Location	Discount Rate (%)	Rate/Price Ratio
Small contour mine, Appalachia	10	0.6
Large area mine, N. Dakota	12	2.9
Medium contour mine, East Rgn.	15	2.1
Large area mine, Midwest	15	2.3
Open pit mine, N. Great Plain	15	4.2
Open pit mine, N. Great Plain	16	4.9

Source: Romani, R.V. et. Al.: Application of a Total System Surface Mine Simulator to Coal Stripping; Penn. St. Univ., Sept. 1977.

production gave way to imported oil. As stated earlier, the discount rate is a composite figure beginning with the cost of capital.

Setting a Discount Rate

In reality, the cost of capital to any individual firm depends upon the company's access to internal funds vis a vis the need for bank funds. The cost of internal funds is the rate of return in the next best investment opportunity. Therefore, the corporate position of the firm --- as an oil subsidiary, metal mining subsidiary, or coal mining corporation -- is more significant in setting the company's planned rate of return than are short term changes in bank lending rates.* However, such information on individual corporate behavior at this level of detail, even if available, would not seem to be a proper basis for estimating value of a public coal deposit. Bank lending rates should therefore be used as the cost of capital component in a discount rate. A telephone survey selected from a list of lending institutions active in coal mine financing (see Appendix 1 for list), indicated that mining companies were charged the prime rate plus a one to five percent risk factor.** Risk was judged in terms of the reliability of the coal deposit estimate, not in terms of the company itself. At the present time (October 1979) the prime rate is thirteen and one half percent, indicating the cost of capital in the discount rate might range from this amount to eighteen percent or more depending upon the risk associated with a given deposit. It is important to note that the risk referred to here is a surcharge above prime actually charged by lenders in the market.

* Also, some companies may be willing (or forced) to accept returns on sunk capital (partially depreciated coal mining equipment) which are less than either internal or market rates for liquid capital.

** Some banks indicated they charged a percent of prime, such as 105 to 115 percent of prime, rather than an add-on charge for risk.

In addition to the cost of capital (whether paid to banks or secured internally) there exists a "normal" profit which can be expressed as a ratio to investment -- a rate of corporate net return -- earned on all assets and which any new investment should yield its share. Historically, between 1950 and 1970, the coal industry has averaged about a one and one-tenth percent annual growth* which can be related to a five percent rate of profit (Newcomb, 1979). In more recent times, an average of eighteen firms showed a before tax profit to total asset ratio of seven and eight-tenths percent in 1973; the same ratio for 1977, averaging sixty-nine firms, was nine and two-tenth percent (Morris Assoc., 1979). Higher rates of net return are typically associated with industries engaged in expansion cycles.

Profits, or net returns, as used here constitute a return over and above direct costs and in effect become retained earnings -- a major internal source of future growth capital. While it is normal for a firm to strive for, and to some degree succeed in, obtaining such profits, it is debatable whether such returns should be explicitly incorporated into the discount rate for evaluating public resources. If they are not included, while in fact they exist in the private sector, then developers of public coal will be penalized relative to developers of private coal.

Based upon the above discussion the following cash flow discount rate formula is suggested:

Discount Rate = Prime Rate + Risk Factor + Corporate Net Return

* Albeit, with wide variation around the mean.

Use of such a discount rate in a discounted cash flow analysis should yield a valid estimate of the residual fair market value of a coal deposit. Table 2 displays some representative rates as they might be established for any given tract.

Currently, the Geological Survey's discounted cash flow model (see Appendix 2 for brief description) uses current prices for coal, current (new) prices for mining equipment, and a discount rate based on guidance contained in Office of Management and Budget Circular A-94 (March 1972). The discount rate formulation suggested above would appear to be a modification well suited to the assumptions of current prices and new mining equipment.* There is, however, an alternative and more traditional method of establishing a discount rate.

The traditional method of setting a corporate discount rate is to apply different rates to the internal (equity) portion of capital and the borrowed (debt) portion of capital; applying a tax adjustment factor to the latter portion (see Appendix 3 for formula). While this is a straightforward application of principals to the individual firm, it is not easily transferable to the typical (but hypothetical) mining operation used to evaluate public resources. In order to apply this method to a generalized model, the following issues would have to be resolved.

* Proposed tax computation adjustments for inflation effects would not affect these assumptions.

Table 2: Representative Discount Rates Computed from Suggested Formula.

Policy and Risk Option	Prime Rate <u>1/</u>	Risk Factor	Corp. Net Return	Discount Rate
Zero Corporate Profit				
Risk free tract	13.5	0	0	13.5
Moderate risk tract	13.5	2	0	15.5
High risk tract	13.5	5	0	18.5
Average Corporate Profit				
Risk free tract	13.5	0	5	18.5
Moderate risk tract	13.5	2	5	20.5
High risk tract	13.5	5	5	23.5
Growth Corporate Profit				
Risk free tract	13.5	0	10	23.5
Moderate risk tract	13.5	2	10	25.5
High risk tract	13.5	5	10	28.5

1/
As of October 1, 1979

1. Equity/debt ratio. What is the proper proportion between equity and debt? Should the ratio vary between mine type (surface and underground) and/or between geographic regions, and how far does one pursue this line of inquiry before the generalized model becomes corporate specific?
2. Equity rate. what is the proper rate of return on equity? Should it be the current (past year) rate, an average past rate, or a planning rate? Mine type and regional questions also apply.
3. Debt rate. At what rate should the debt portion be charged? Should the prime plus resource risk (current cost) rate be used thereby implying new debt; or should the debt be assumed partially or wholly incurred, in which case a corporate bond rate would be appropriate, but of what maturity?
4. Tax rate adjustment. This is the only issue quickly dispensed with, the tax rate should clearly be that which is assumed for the model as a whole. Answers to these questions cannot be indisputably arrived at by a collection of facts, since the receiving model is not corporate specific. Table 3 provides some representative rates based on the traditional formula and common assumptions; as can be seen, this discount rate could vary roughly between six and fifteen percent.

Inflation

A final note on the role of inflation may be in order. In principal, the discount rate should conform to the over all treatment of inflation in the discounted cash flow model; in the Geological Survey model this would mean inflation-free, since prices and costs are current and held constant throughout the time cycles of the model. The "current" cost of money

Table 3: Representative Discount Rates Computed
From Traditional Formula 1/

Rate Description	Equity Rate 2/	Debt Rate 3/	Discount Rate
Low Range	4.4	13.5	6.0
Median Level	12.7	15.5	10.2
High Range	20.6	18.5	14.6

1/ Formula 1b, Appendix 3 using a median equity proportion of 43%
(Morris Assoc. 1978) and a tax rate of 46%.

2/ Using accounting data for 69 firms (Morris Assoc., 1978).

3/ From Table 2.

(interest rate), however, contains a market estimate of long term inflation. In the suggested discount rate formulation, the market rate provides the basis of the discount rate and is considered justified as the current cost of financing new equipment. In the traditional formulation, the market rate enters as the debt rate. In either case, a long term bond rate could be used instead of the prime rate (as used in the examples), if it were assumed the typical mining operation would raise its own capital rather than go to a lending institution. It is not considered appropriate to adjust a discount rate for inflation by means of a common inflation index (such as the consumer price index), since such indexes are based on the prices of goods and services -- the price of money is best expressed in the financial markets.

Appendix 1

Selected Financial Institutions Active in Coal Mine Financing

Bank of America (cal.)

Chase Manhattan (N.Y.)

Chemical Bank (N.Y.)

Citibank (N.Y.)

Continental Bank (Chicago)

Irving Trust (N.Y.)

Manufactures Hanover Trust (N.Y.)

Morgan Guarentee (N.Y.)

Republic National Bank of Dallas (Tex.)

Appendix 2

Discounted Cash Flow Model for Publicly-owned Coal Resources (Abstracted from Pederson, et. al., 1979)

The U.S. Geological Survey Coal Resource Economic Evaluation

Procedures were developed to estimate the economic value of publicly-owned coal resources. These procedures are used to determine the value of competitive coal tracts, lease modifications, and land exchanges in addition to assessing commercial quantities for preference right lease applications. The methods currently used in performing tract evaluations are the comparable sales analysis and the income approach. The comparable sales analysis considers recent transactions in the vicinity of those lands being evaluated. The income approach, or discounted cash flow (DCF), uses the annual costs and revenues resulting in the development and production of the coal resource on the tract being evaluated to determine net present value. The DCF model portrays the time life cycle, which is divided into four phases: predevelopment, development, production, and post-production, with appropriate activities defined for each phase. The model is designed so that the duration of each phase can be varied independently of the other phases in the project's life. All outlays of funds over the life of the project, from predevelopment to post-production, are grouped into appropriate cost categories. Revenue is calculated using the price of coal applied to the production schedule. The annual cash flows are then discounted using an appropriate discount rate and summed to obtain net present value.

Assumptions

The coal tract evaluation model is based upon the following assumptions:

1) The USGS, Conservation Division, resource and reserves determination procedures (USGS-USBM Bulletin 1450B9) will be used in evaluating

tracts for competitive lease sale or for potential preference right lease applications.

2. The Tract Resource and Development Summary Reports or preliminary Mining Plans when available, reflect tract geological and environmental conditions as well as the actual manner in which the coal will be mined, the lands reclaimed, and method of mining.
3. Developed lands will be restored to conditions representative of prior use.
4. The basis for royalty collection and pre-sale evaluation are determined from the selling price of coal at the point of shipment.
5. The evaluation is based upon the project alone, thereby disregarding financing considerations and/or financial policies of the firm.
6. The mining operation is conducted by a taxable corporation in a profit-making position.

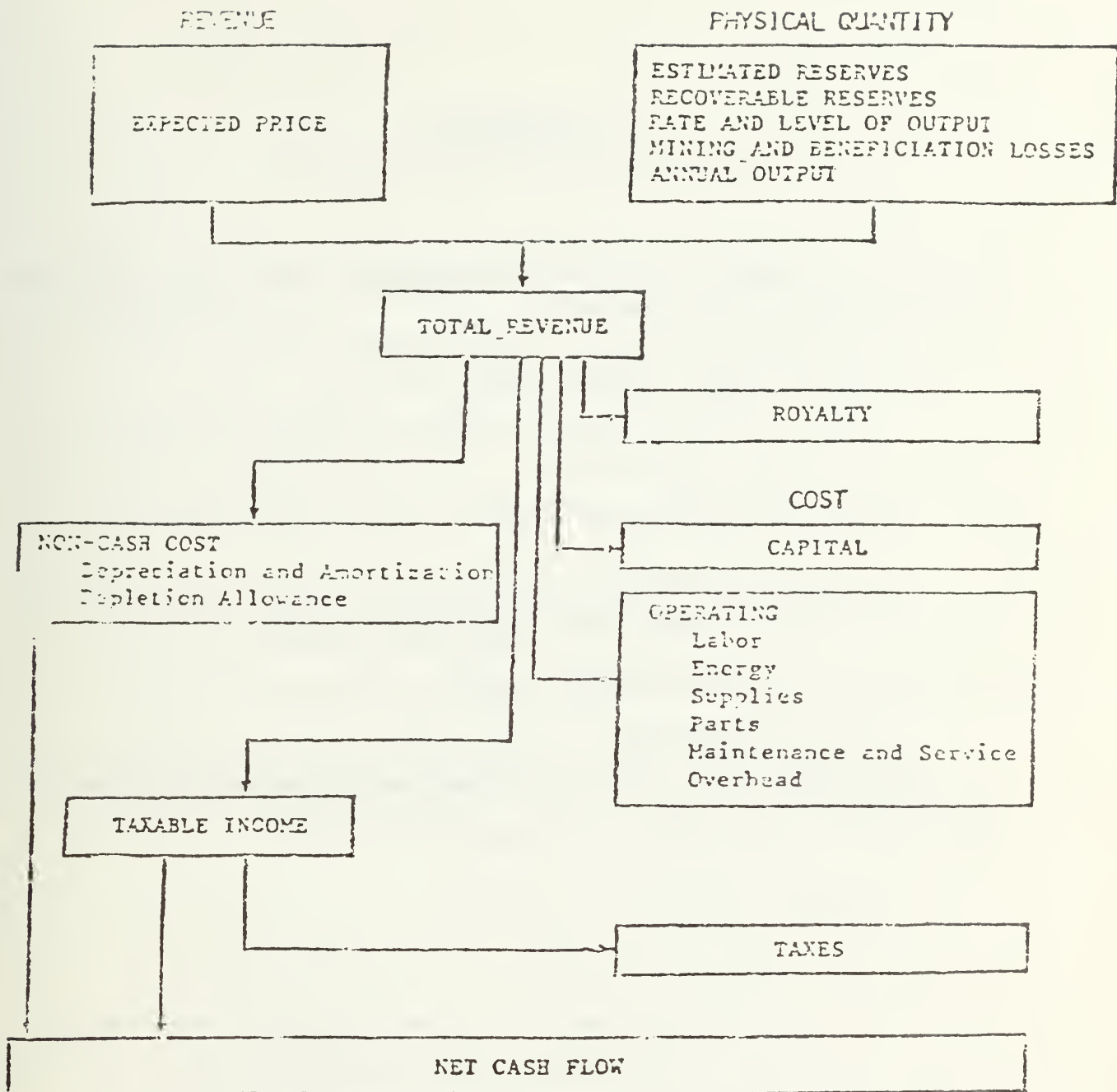


Figure 1.—Data categories (Adapted from Rudawsky (1977))

"Reprinted from "Economic Feasibility Studies in Mineral and Energy Industries" Part I, Mineral Industries Bulletin, Vol. 20, No. 3, May 1977, by Rudawsky, Oded, by permission of the Colorado School of Mines".

Appendix 3

Traditional Discount Rate Formulation

The following formula can be considered standard, based on the traditional cost of capital approach (ICF,1976).

$$1a) \quad DR = (E)(R1) + (D)(R2)(1-t)$$

Where:

DR = discount rate

E = % of equity capital

D = % of debt capital

R1 = cost of equity capital

R2 = Cost of debt capital

t = tax rate

If accounting data were used, such as that readily available on a national basis (Robert Morris Assoc., 1978), to estimate the above components, the formula could be modified as follows:

$$1b) \quad DR = (E)(R1)(t) + (D) (R2)(1-t)$$

Where:

DR = discount rate

E and D are computed from the "debt to net worth" ratio

R1 = "% profit before tax to net worth" ratio

R2 = prime or corporate bond rate

t = tax rate

List of References

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3. Office of Management and Budget; Circular No. A-94; Washington, D.C., March, 1972.
4. Pederson, John A. et. al.; Coal Resource Economic Evaluation; (February, 1979).
5. Rapport, L.A. and W.R. Hibbard Jr.; "Representation of the U.S. Coal Industry in Context of Integrated Long-Range Energy Modeling," Materials and Society; U.K., 1978.
6. Robert Morris Associates; Annual Statement Studies; Philadelphia, 1978.
7. Romani, R.V. et. al.; Application of a Total System Surface Mine Simulator to Coal Stripping; Penn. St. Univ., Sept. 1977.

WRITTEN COMMENTS ON FAIR MARKET VALUE

RECEIVED BY THE TASK FORCE

(see also transcript of Denver town
meeting; November 1, 1979)



Western Fuels Association, Inc.

GENERAL MANAGER
WESTERN FUELS ASSOCIATION
1000 17TH AVENUE
DENVER, COLORADO 80202

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November 5, 1979

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Sikeston, Missouri

Honorable Cecil D. Andrus
Secretary
Department of the Interior
Washington, D. C. 20240

Dear Mr. Secretary:

Thursday of last week, I attended and spoke as a public witness to the "Fair Market Value" Task Force at its meeting in Denver, Colorado. I enclose a copy of my prepared statement for your convenient reference.

Obviously, the presentations made by the government employees and the outside expert commentators were the product of a lot of talent and effort. Unfortunately, that talent is forced to consider the wrong question.

In my judgment, the important public policy question related to the coal resources in public ownership is "How can the government manage these resources to achieve the maximum benefits (savings) for the energy consumer?" This seems the appropriate objective at all times and it is obviously even more important with high energy prices a major contributor to a troublesome inflation.

I know that the provisions of the "Federal Coal Leasing Amendments Act of 1975" limit your ability to redirect the Department of the Interior effort. Nonetheless, I urge you to do what you can within the framework of existing law. I respectfully suggest that the Department develop appropriate amendments to the legislation so that these resources can be utilized to achieve the maximum benefit for the American consumer. We would be pleased to support such an effort with the Congress.

Sincerely yours,

Ken Holum
General Manager

Enclosure

H:kh

STATEMENT OF
KENNETH HOLUM, GENERAL MANAGER
WESTERN FUELS ASSOCIATION, INC.

BEFORE MEETING OF
DEPARTMENT OF THE INTERIOR
FAIR MARKET VALUE TASK FORCE FOR FEDERAL COAL MANAGEMENT

HOLIDAY INN (DOWNTOWN)
DENVER, COLORADO

NOVEMBER 1, 1979

Western Fuels Association, Inc., is a non-profit Wyoming corporation organized and existing for the purpose of securing fuel supplies for rural electric cooperatives and municipal electric utilities. We also arrange for the delivery of those fuels to the members' point of use.

Western Fuels Association exists for the purpose of keeping energy costs as low as possible for the ultimate consumer -- "the little man at the end of the line." We consider this a meritorious objective -- at all times -- and even more meritorious at a time when inflation and high energy costs are adversely affecting so many consumers.

Our 24 members reach from the Pacific to the Mississippi and beyond and form a continuous span for Canada to the Gulf of Mexico.

Without indulging in the complications that seem to bedevil economists and keep them occupied, and realizing that your time constraints impose inhibitions on me, I would like to offer a few comments as spokesman for an organization that cares deeply about consumers. I appreciate the opportunity to do so.

(1) The people will be better served if the resources they own are used to keep energy costs low rather than to maximize the return to the Federal Treasury.

(2) The dominant position of the Federal Government in western coal means that the Federal Government determines royalty rates not just for the Federal Government but for state-owned and privately owned resources as well. The Department of the Interior itself recognized this fact when it abandoned plans to seek royalties in excess of 12.5 percent.

(3) Establishing royalty rates on coal owned by the people at levels designed to protect private investors in another area of the country rather than to keep energy costs low for consumers means that the government is

placing the welfare of these entrepreneurs above the interests of the consuming public.

(4) The 8-percent royalty rate for deep mined coal and the 12½-percent royalty rate for strippable coal exceeds the royalty rates under which midwestern and eastern coal is available in the present market.

(5) Properly managed, the publicly owned coal resources can provide a strong lever to help keep the costs of all types of energy at reasonable levels for consumers in 49 of the 50 states. Why not use this immense resource as a yardstick so that the people and the public officials can judge the performance of the energy industry?

(6) Finally, and I realize that this suggestion may be outside of this group's assignment, I urge the Department of the Interior and other involved state and federal agencies to expedite their review and permitting process so that the consumer is not forced to bear increased costs as a result of delays caused by government agencies. If this requires additional personnel and appropriations, the Congress should be asked to provide them.

In conclusion, Western Fuels Association does not consider difficult the choices facing the Department of the Interior. The Department's overriding obligation is, and should be, to the American people who own the resource. They urgently need assistance from all of the forces that drive energy costs through the roof. Providing that assistance now is your challenge and your opportunity. You should discharge that responsibility by aggressive action designed to get the economic benefits from these publicly owned resources to "the little man at the end of the line" -- the ultimate consumer.

You can help accomplish that objective by recommending and supporting royalty rates on publicly owned coal resources at the lowest levels permitted by law. Beyond that, the Executive Branch could serve the public interest well by recommending to the Congress that they reconsider and lower the royalty rates established in the Federal Coal Leasing Amendments Act of 1975.



Lower Colorado River Authority

Post Office Box 220 Austin, Texas 78767 AC 512 474-5931

R. M. TINSTMAN, Assistant General Manager

November 12, 1979

Mr. Charles Towle
c/o Office of Policy Analysis
U. S. Department of Interior
Main Building
Washington, D.C. 20240

Dear Charles:

Thank you for the opportunity to be present at the meeting in Denver on November 1, and to share the following with you and the other members of the Task Force on the Bidding Policies and Procedures for Federal Coal Leases.

Permit me to first and briefly identify the Lower Colorado River Authority (LCRA). It is an agency of the State of Texas and as such is non-profit and tax-exempt. Our unusual situation was recognized by being designated as one of the hardship situations in the compromise settlement of NRDC vs. Hughes. The following is expressed in an effort to be constructive and helpful to your Task Force and the Department of Interior.

Replacement Fuel. - During the public discussion in Denver on November 1, one consultant discussed at length and challenged the projections as to electric energy consumption. The need for replacement fuel in lieu of natural gas and oil must not be overlooked by our federal government. This switch to alternate fuels is both national policy and in some cases mandated to electric utilities. A considerable portion of the coal supplies needed in our country will be not just for growth reasons, but for replacement reasons.

Effect of Supply on Market. - From the point of view of a coal/lignite user, the federal role in the coal market is so significant that federal controlled or restricted supply of coal will distort without question the "fair market value". Thus the federal government could be clearly in the posture of actually making or setting fair market value as distinguished from determining what is fair market value within a normal market place. In this connection, this should be cause for encouraging your stated

Mr. Chalres Towle
November 12, 1979
Page 2

policy that the availability of coal or lignite be on the plus or high side in an effort to not drive the market up, and thereby cost the consuming public more.

Effect of Royalty Rates. - High government royalty rates would, without question, have an inflationary effect on royalties paid private property owners and thereby contribute to accelerating inflation throughout the nation. In addition, high government royalty rates (or bids), would tend to encourage inefficient mining by reason of the mine operator tending to not mine coal or lignite which has a higher unit cost.

Compliance with Congressional Action. - Determination by DOI of what is fair market value in reviewing bids needs to be distinguished from not making or setting fair market value by federal government control of production or use of royalty bonus terms. Royalties paid the federal government by successful bidders should not be used to:

- (1) control supply; -
- (2) establish "market"; - and
- (3) establish value (fair market value).

*

*

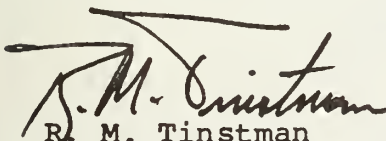
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While the above statements may not be new, please accept them as intended to give emphasis and thereby be constructive. You and your associates are to be assured of the awareness of many of us of your conscientious diligence in treating this matter.

In closing, permit me to observe that the particular theory (discounted cash flow or otherwise) and related considerations discussed at length on November 1, seem secondary or certainly of lower priority than the above described considerations.

Thank you for your willingness to share this with others involved in this review.

Sincerely yours,


R. M. Tinstman
Assistant General Manager

T/b
Cc: Charles Herring, General Manager



NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION
1800 Massachusetts Avenue, N.W.
Washington, D.C. 20036/202-857-9500

November 15, 1979

Mr. Charles Towle
Department of the Interior
Room 4142
18th & C Streets, NW
Washington, D.C. 20240

Dear Mr. Towle:

Attached are the comments from the National Rural Electric Cooperative Association's Federal Coal Land Leasing Committee on the Fair Market Value Study.

Your consideration of these comments will be appreciated.

Respectfully submitted,

A handwritten signature in cursive script, reading "Richard W. Sternberg".

Richard W. Sternberg
Staff Liaison to the
Federal Coal Land Leasing
Committee



Statement of NRECA

on

Fair Market Value

To accomplish the President's oil reduction program other sources of fuel must be found. The use of solar and synfuels is in the future. We must have a fuel supply now. This is why the leasing of federal coal is so important.

The Council on Wage and Price Stability in mid-October said "that unless the federal government improves its methods for pinpointing leasing targets, there is a risk that consumer prices for coal will rise unnecessarily."

The August, 1979 issue of "The Petroleum Situation", published by The Chase Manhattan Bank, also gives some insight into the reason why the use of coal has not increased as predicted and why it is expected to double by 1990. The article on the "United States Coal Outlook" states, "that environmental and safety legislation, while necessary in concept, have significantly increased the cost of mining, transporting, storing and using coal, thus offsetting much of the comparative cost advantage to coal from rising OPEC oil prices. In addition, coal was put at a further disadvantage by the fact that the federal government kept oil and natural gas prices below the market level. Other factors adversely affecting coal costs have been higher wages, royalties and severance taxes, as well as increased costs of equipment, supplies and transportation."

"The net effect of these conditions is illustrated in the following tables:"

Relative Fossil Fuel Costs
For Large Industrial Users

	1978 Relative Costs	Fuel Component	Non-fuel Component
Coal	100	47%	53%
Low-Sulfur Fuel Oil	81	77%	23%
Natural Gas	70	86%	14%

"Shown is a comparison of the relative costs of the three fossil fuel alternatives available to a large industrial user. The annual costs of low sulfur fuel oil and natural gas have been indexed to the relative annual costs of the coal option; that is coal equals 100. In addition, the percentage distribution of fuel costs and non-fuel costs to the total cost of each alternative is indicated. The fuel oil cost component includes recognition of wellhead price controls on domestic crude. As the table indicates in 1978, coal was at a substantial economic disadvantage relative to oil and natural gas. When all user costs are taken into account, oil was 19 percent cheaper than coal while natural gas held a 30 percent advantage for large applications. As shown in the table, coal's inherent fuel cost competitiveness was far more than offset by its substantial non-fuel charges, that reflect in large measure the cost of complying with government regulations."

Changes that are expected to lead to a doubling of coal demand by 1990 are the deregulation of domestic crude oil prices, the Natural Gas Policy Act of 1978, and the Environmental Protection Agency's announcement of new source performance standards that have taken a moderate stand on sulfur dioxide emissions from new power plants.

We generally agree with many of the recommendations made in DOI's draft April 1979 report on "Fair Market Value of Federal Coal: Concepts and Procedures." However, we disagree with the discounted cash flow (DCF) method of determining fair market value (FMV). There are too many assumptions made when using the DCF method of determining the FMV (e.g. transportation costs, environmental costs). If competitive bidding was used, the tracts desired by a utility would be bid on, therefore setting the FMV. Also, if only one utility was interested in a particular tract, they should not be excluded.

The government should not be interested in obtaining the greatest return for a lease, but just so it doesn't lose money. This will help insure that the consumers do not have their rates increased.

We support the practice of increased royalties be dropped and that lease sales under the Federal Management program be offered with minimum statutory royalty rates. However, we disagree that regulatory royalty rates should be continued for underground coal. It was not Congressional intent to have royalty rates for underground coal.

We disagree that the consideration of non-market factors be dropped. Factors that should be considered among others are the oil import reduction program and the inflation.

We agree that there should be adequate public comment participation on the FMV, but there should be a restriction on the time period so there will not be a delay on the leasing of coal.

We agree that a documented appraisal be prepared but it should be issued before the lease is issued-not after.



UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SOLICITOR
WASHINGTON, D.C. 20240

NOV 21 1979

Memorandum

To: Director, Office of Coal Leasing, Planning
and Coordination

From: Assistant Solicitor, Onshore Minerals
Division of Energy and Resources

Subject: "Fair market value" in federal coal leasing

Summary

The Mineral Leasing Act, as amended in 1976, provides that federal coal leases shall not be issued for less than "fair market value." The statute does not define this phrase, nor does the legislative history. Departmental policy does suggest that fair market value be determined by reference to comparable sales whenever possible. An income method of appraisal is appropriate only when comparable sales appraisal is not available.

Discussion

Prior to the amendment of the Mineral Leasing Act in 1976, by Pub. L. No. 94-377, 30 U.S.C. §§ 201 et seq. (1976), there was no statutory requirement regarding minimum value to be received for leases of federal coal. The policy of the Department of the Interior was to require a relatively small bonus bid of \$1.00 to \$10.00 per acre and production royalty payments on a fixed cents-per-ton basis. Congressional displeasure with this long-standing practice, and the absence of competitive bidding in most sales, led to the imposition of new standards in 1976. Federal Coal Leasing, Hearing on H.R. 3265 Before the Subcomm. on Mines and Mining of the Comm. on Interior and Insular Affairs, 94th Cong., 1st Sess. 37-39 (1975).

As amended, the Mineral Leasing Act authorizes the Secretary to offer lands for leasing and to award leases by competitive bidding. However, "no bid shall be accepted which is less than the fair market value, as determined by the Secretary, of the coal subject to the lease." 30 U.S.C. § 201(a)(1) (1976). In addition, the Act prescribes a minimum royalty of 12 1/2 percent of the value of the coal (with lower rates if justified for coal produced by underground methods). 30 U.S.C. § 207(a) (1976).

The statute, unfortunately, does not define "fair market value," nor does the legislative history define the phrase. Where the relevant section of the bill was discussed, the language was merely repeated verbatim or equally opaque language substituted. S. Rep. No. 296, 94th Cong., 1st Sess. 13 (1975) (fair market value); H.R. Rep. No. 681, 94th Cong., 1st Sess. 18 (1975) (fair return). The legislative history does suggest that Congress believed that the requirements imposed by the amendments would be effective in guaranteeing receipt of fair market value.

The Committee feels strongly that the Federal Government should receive fair market value for public resources being used by private parties. Awarding leases by competitive bidding should help assure that this goal is achieved. The changes in the rental and royalty rates . . . will be another significant step toward fair return.

S. Rep. No. 296, supra at 13. The House Report listed five factors which would ensure a fair return to the public: competitive bidding, requirement of fair market value, increased royalty rates, readjustment of lease terms, and abolition of preference right leases. H.R. Rep. No. 681, 94th Cong., 1st Sess. 18 (1975).

Two other Federal statutes impose fair market value requirements on the disposition of Federal lands or minerals. Federal Land Policy and Management Act, Pub. L. No. 94-579, §§ 203(d), 209(b)(2), 43 U.S.C. §§ 1713(d), 1719(b)(2) (1976); Outer Continental Shelf Lands Act, as amended by Pub. L. No. 95-372, §§ 201(c), 208 (amending § 18), 208 (amending § 27) (1978) (to be codified at 43 U.S.C. §§ 1331(c), 1344(a)(4), 1353(a)). Fair market value is not defined in FLPMA or its legislative history. The OCS Lands Act provides a detailed definition; but only with regard to the purchase or sale of natural gas or oil by the United States. 43 U.S.C. §§ 1331(c), 1353; H.R. Rep. No. 1474, 95th Cong., 2d Sess. 79 (1978). The requirement that the OCS leasing activities be conducted to assure receipt of fair market value is therefore no better defined than the provision of the Coal Leasing Act.

The Department of the Interior Manual, however, does impose some constraints on the determination of fair market value. Appraisal standards for the acquisition and disposal of real property are identical. Departmental Manual § 602.1.3. In a succeeding section, the phrase "leases, sales or other dispositions" appears, indicating that a lease is a disposition falling within the scope of the appraisal standards. Departmental Manual § 602.3.1. The guide for appraisals by all Interior Bureaus and Offices is Uniform Appraisal Standards for Federal Land Acquisitions [UAS], published by the Interagency Land Acquisition Conference Committee, 1973. Departmental Manual § 602.1.3.

The UAS guide strongly recommends use of the comparable sales method of appraisal to determine fair market value.

In the absence of prior sales of the land taken [in a condemnation action], arm's-length transactions in lands in the vicinity of those taken at about the time of taking are the best evidence of market value. 1/ Too often it has been found in appraisal reports and appraisal testimony that the comparable sales approach has been relegated to a position as simply one of various approaches to value, with more time and attention being given to other generally less reliable approaches to value.

* * * * *

When there are adequate sales, however, there is little reason to dwell on other approaches to value to any great extent. As stated by the Supreme Court of the United States, "Where private property is taken for public use, and there is a market price prevailing at the time and place of the taking, that price is just compensation." 2/ The comparable sales approach normally should be stressed and care should be taken that it does not get lost among other evidence concerning less reliable approaches to value. Since it is the only approach to value that reflects the balance of supply and demand in actual trading in the market place, it usually develops the most acceptable and convincing evidence of the fair market value of the property.

1/ E.g., Baetjer v. United States, 143 F.2d 391, 397 (C.A. 1, 1944), cert. den. 328 U.S. 772; Welch v. Tennessee Valley Authority, 108 F.2d 95, 101 (C.A. 6, 1939), cert. den. 309 U.S. 688.

2/ United States v. New River Collieries, 262 U.S. 341, 344 (1923).

UAS, supra, at 9 (footnotes renumbered). With regard to a discounted cash flow or income method or appraisal, the UAS guide observes:

There are, of course, some income producing, investment-type properties where the "income" (now frequently referred to as the "earnings") approach

is particularly relevant. However, even when valuing that type of property, where there are a reasonable number of sales demonstrating what buyers and sellers are actually paying in the market for comparable properties, reliance upon a valuation approach other than the comparable sales approach should be given careful consideration.

The above cautionary note is warranted. Initially, use of the income approach frequently consumes a disproportionate amount of time, and, as a result, it received unmerited emphasis to the detriment of the sales evidence which demonstrates what buyers and sellers are paying on the market for comparable income producing properties.

Id. at 13-14.

Conclusions

The Department is not required by law to use only the comparable sales approach to determine fair market value. Assuming that leases are a form of disposal, however, Departmental policy does require that alternative methods be adopted only when the comparable sales method is shown to be inadequate. As the UAS guidebook suggests, the income approach is not preferred, if comparable sales data are available. Any program policy that avoids the use of comparable sales data must either: 1) document the absence of such data; 2) document why such data, if they exist, are not truly comparable, for example, why private sales data cannot be applied to federal coal; or 3) include a conscious determination to alter the Departmental Manual's applicability to coal leasing.

/s/
Lawrence G. McBride

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